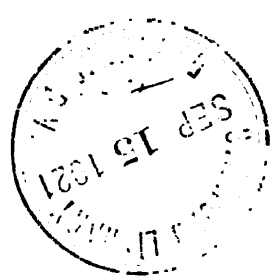
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MICHIGAN GEOLOGICAL AND BIOLOGICAL SURVEY.

Publication 13.
Geological Series 10.

Mineral Resources of Michigan with Statistical Tables of production and value of mineral products for 1912 and prior years

PREPARED UNDER THE DIRECTION OF

R. C. ALLEN

DIRECTOR, MICHIGAN GEOLOGICAL AND BIOLOGICAL SURVEY

PUBLISHED AS A PART OF THE ANNUAL REPORT OF THE BOARD OF GEOLOGICAL AND BIOLOGICAL SURVEY FOR 1912.

LANSING, MICHIGAN
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1913

BOARD OF GEOLOGICAL AND BIOLOGICAL SURVEY, 1912.

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LETTER OF TRANSMITTAL.

To the Honorable, the Board of Geological and Biological Survey of the State of Michigan:

Gov. Woodbridge N. Ferris, President.
Hon. Wm. J. McKone, Vice President.
Hon. L. L. Wright, Secretary.

Gentlemen:—Under authority of act number seven, Public Acts of Michigan, Session of 1911, I have the honor to present herewith Publication 13, Geological Series 10, the second of a series of annual statements of the production and value of the mineral products of Michigan.

Very respectfully,
R. C. ALLEN,
Director.

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INTRODUCTION.

This is the second of a series of annual statements regarding the mineral industry of the state with statistical tables of production and value of mineral products.

Under a co-operative agreement with the United States Geological Survey reports of production and value of mineral products and other items of information have been received directly from the producers, except in cases of copper, iron, pig iron and coal.

It is not possible in an annual statement of this character to treat all of the various mineral industries in detail. In the preceding volume (Publication 8) there was contributed an important and exhaustive article on the copper industry with briefer and more general surveys of the other mineral industries. For this volume there was prepared a discussion in great detail of the occurrence of oil and gas, together with important deductions concerning areas most likely to yield commercial quantities of these products in this state. Recent activity in drilling for oil and gas not only stimulated the production of this article but contributed directly to the information contained in it. A number of important deep wells have been drilled and records of these, together with the records of other important borings, are incorporated. It is believed that this discussion will be of very considerable value, particularly to those engaged in an attempt to establish an oil and gas industry in Michigan. On completion it was found advisable to issue this monograph as a separate publication because of space limitations and greater effectiveness in distribution. Those desiring a copy of the work should make application for Publication 14, Geological Series 11. Other mineral industries will be treated in exhaustive manner from year to year.

In addition to the statistical tables there is included herein a complete revised list of the mineral producers of Michigan. The results of the publication of this list a year ago has shown the advisability of keeping the list revised and up to date for annual issue.

Thanks are due to those who have colaborated in the production of this volume. Special thanks are tendered to the mineral producers who have responded so promptly and so generously to requests for statistical data.

R. C. ALLEN,
Director.

Lansing, Michigan, October 9, 1913.

MICHIGAN COPPER INDUSTRY IN 1912.

BY REGINALD E. HORE, MICHIGAN COLLEGE OF MINES.

The year 1912 was a very profitable one for Michigan copper mining companies and employees. Good prices were obtained for the metal and the companies made larger profits while paying higher wages than in previous years. The dividend paying companies made larger disbursements than in 1911 and increased their surplus of assets. Large amounts were spent for construction and development work at the producing mines, and more vigorous examination made of several properties that are not yet productive. Some of the latter have been extensively developed and can be counted on to soon make shipments of ore to the mills. One at least will begin producing in 1913. Two new companies and one reorganized company, began diamond drilling investigations that are expected to be continued over large acreages.

An unfortunate circumstance, and one most keenly felt by companies whose property is not centrally located, has been the scarcity of suitable labor. In spite of the increased wage offered, many of the companies, during the summer months especially, were unable to secure enough men to permit of very economical operation. This inability to run the mines at capacity prevented the owners from taking full advantage of good copper prices and increased the cost per ton produced. The increase in cost due to labor scarcity, has been partially but not wholly, offset by improvements in methods. Recently there has been more than ordinary attention paid to the improving of efficiency of all departments. New methods and machines and less waste of labor and supplies have materially decreased the cost of breaking and handling the ore underground. Labor saving devices have cut down the rock-house costs. New machinery installed at the mills gives a better recovery from the ore treated. Use of larger furnaces and more mechanical appliances to handle charge and furnace products has lowered the cost of smelting. In spite of the many improvements, the year 1912 will show higher costs per pound of copper produced. This in most cases at least, is due to higher wages paid, and means simply that the mine owners are sharing with the miners the profits of a successful year.

The following tables from statistics collected by the Engineering & Mining Journal show the prices quoted for each month of the past

six years and the visible stocks of copper in United States and Europe in each month of 1909, 1910, 1911 and 1912.

A period of four lean years has been succeeded by one of good prices. In October, 1907, after several months of unusually high prices, there was a drop to below 14 cents per pound and until November, 1911, there was only occasionally a higher mark reached and for the year 1911 the average price was below 13 cents. Improved demand for the metal became noticeable in the closing months of 1911 and in June 1912 the price advanced to over 17 cents. The latter part of 1912 has been marked by firmness in price, in spite of uneasiness caused by the Balkan war. A number of authorities, while inclined to believe that the December price cannot be maintained, state that there is good reason to expect fair prices in 1913. During 1912 there was a very large increase in the world's production of copper to meet the increased demands of manufacturers. The increase in United States production was about 150,000,000 pounds, yet no very considerable increase in visible stock was made until late in the year. By November, production had made some advance on consumption and the year closed with fairly large stocks on hand. The year 1913 opened with a poorer market and increased uneasiness in Europe over the Balkan situation.

During 1912 the dividend-paying mining companies paid to shareholders $9,901,875 and added considerable amounts to surplus account. Ahmeek, Baltic, Calumet & Hecla, Champion, Mohawk, Osceola, Quincy, Trimountain and Wolverine all paid larger dividends than in 1911. Dividends paid for the past five years and to date were as follows:

DIVIDENDS PAID BY MICHIGAN COPPER COMPANIES.

	1908	1909	1910	1911	1912	All years.
Ahmeek				100,000	900,000	1,000,000
Atlantic						990,000
Baltic	900,000	1,000,000	1,000,000	500,000	700,000	7,750,000
Calumet & Hecla	2,000,000	2,700,000	2,900,000	2,400,000	4,200,000	120,050,000
Central						2,130,000
Champion	500,000	500,000	900,000	500,000	1,100,000	7,500,000
Cliff						2,518,620
Copper Falls						100,000
Franklin						1,240,000
Kearsarge						160,000
Minnesota						1,820,000
Mohawk	250,000	300,000	200,000	150,000	350,000	2,650,000
Osceola	192,300	769,200	961,500	721,125	1,201,875	10,881,650
Quincy	495,000	440,000	412,500	440,000	550,000	20,430,000
Tamarack						9,420,000
Trimountain	500,000		150,000		300,000	1,250,000
Wolverine	600,000	600,000	600,000	540,000	600,000	7,440,000

In 1912 Copper Range Consolidated, from profits made by ownership of shares of Baltic, Trimountain and Champion Mining companies, distributed $787,382. St. Mary's Canal Mineral Land Co., from profits made from half ownership of Champion Copper Co. and from sales of land distributed $480,000 to shareholders.

Soon after the higher prices became established, the Michigan copper companies increased the wages of the miners. The increase, amounting to about 10% at most mines, was made voluntarily and reflects a willingness on the part of the owners to share profits with employes. During the four lean years wages were necessarily low and yet plenty of men were available. In spite of the higher wage offered there has been considerable difficulty in maintaining efficiency during 1912. Good men being not always obtainable, the companies have in many cases been compelled to keep on their rolls an unusually large percentage of poor and inexperienced workmen. Inability to secure suitable men has made it impossible to run some of the mines at their usual rate and as a result there has been a natural increase in cost per ton due to lower production as well as an increase due to higher wage. It is expected that costs per pound of copper will be from one-fourth to one-half cent higher than in 1911. This is largely to be charged to labor, though greater expenditure for construction has materially increased costs at some mines.

The increased wage has in some cases not been reflected in higher costs, owing to many of the miners having increased in efficiency. Using better machines and operating and caring for them more intelligently the miners can earn larger wages while decreasing the cost per ton. The one-man drills, which have only recently been largely in use, have proved remarkably successful and have been adopted as a standard at several mines. It is therefore possible for the company to pay higher wages, as the saving in labor is much larger than the increased cost of supplies and repairs. The miners are earning much higher wages than the companies could afford to pay under the old conditions. At several mines graduates of the Michigan College of Mines and other colleges are employed as "efficiency" engineers. These men have themselves worked as miners and devote their attention to improving underground practice. They instruct the miners in use and care of the machines, study and compare costs of different methods of mining and handling the ore and guard against waste of air and supplies.

The year 1912 has been marked by unusual amount of construction. Surface equipment has at several mines been much improved. Several large rock-houses equipped for easier and cheaper handling of the ore have been completed. New engines and hoists have been installed

to allow of increased production. Many of the mills have been much improved and special attention has been devoted to increasing recovery by finer grinding. The Hardinge conical pebble mill has been found very suitable for grinding the sands and several have been installed. Improvements have also been made in classifiers and jigs. Experiments with low pressure turbines to utilize exhaust steam from the stamps proved very successful and turbines are being installed at the Baltic, and Calumet and Hecla stamp mills. Several of the Calumet & Hecla subsidiary companies have made extensive changes in their mills during the year and better recovery has been obtained by the remodelled plant. An arrangement has been entered into by the Allouez, Centennial, Tamarack, Isle Royale and Superior companies to provide additional milling facilities and the Tamarack and Allouez-Centennial mills are being fitted with new machinery. A railroad spur has been constructed to connect the Superior and Isle Royale mines with the Mineral Range Railroad and the ore from the Superior and some from the Isle Royale will be hauled to the Allouez-Centennial mill for treatment. At present the Superior mine ore is being handled at the Atlantic mill. The Isle Royale has its own mill, but this is working at full capacity and cannot be conveniently enlarged to take care of the desired increase in production.

Development work at the producing mines has been energetically carried on and the cost, as usual, charged to operating expenses. At several mines the amount of such work has been recently exceptionally large. In some of the larger mines this is due to the introduction of different methods of mining the ore. There is a tendency in favor of the plan of working out the lode from the boundary towards the shaft. This method, long in use on the Calumet and Hecla conglomerate lode, necessitates openings being far ahead of stoping operations. In mines where a change to this method is being made, there is now a very large amount of drifting being paid for. At some of the smaller mines development has been larger than present output demands, because of a desire to make substantially greater production. The Franklin and Mass mines have used large sums of money for this purpose and should soon begin to reap the benefit from these preparations. The Lake Mine has just been brought into shape for production and very little stoping has yet been done. At the Hancock, attention has been devoted entirely to development and since running a mill test on ore from No. 3 lode, no shipments have been made. At the Ojibway, a small force has been employed in opening up the lode at lower levels, a mill test carried on in the latter months of 1911 having shown the average values in the earlier opened ground to be low. At the Superior mine remarkable results have been obtained in opening up the

West Lode and the production for the past few months has been largely from this development work. While testing this lode and awaiting milling facilities, stoping operations on the Superior lode have been light. At the LaSalle very little was done during 1912 and the Adventure, Keweenaw, Michigan, and Gratiot were not producers. The latter three were idle. Adventure continued exploration of lodes from the vertical shaft. At the Cliff mine some cross-cutting and drifting was done. Of mines which have never yet figured as producers the ones doing development work during 1912 were Algomah, Houghton, Indiana, Laurium, New Arcadian, New Baltic, North Lake, Oneco, St. Louis, South Lake and White Pine. At Algomah little ore was found. At the Houghton mine the Superior lode was opened up and disclosed good ore similar to that at the Superior mine. At the Indiana copper was encountered at several points but little opening was done as efforts are being concentrated on sinking the shaft to reach the depth from which very promising drill cores were obtained. This should be accomplished early in 1913. At Laurium, New Baltic, St. Louis and Oneco exploration was rewarded occasionally by disclosure of copper ground but no extensive ore-body was developed. At New Arcadian, North Lake and South Lake shaft sinking was started during the year. At White Pine a large quantity of good ore was blocked out and much additional information obtained regarding the faulting of the lodes.

Diamond drilling was carried on by more companies than in 1911 and was particularly successful at the Mayflower and Old Colony properties. A number of remarkable cores were obtained from the Mayflower lode and the companies have good reason to believe that they have found an ore body that will be a large producer. Drilling is being continued to further define the lode and the structural conditions before sinking a shaft. The Naumkeag Copper Co. has two drills working on the property southwest of Houghton which the company was recently incorporated to develop. The Onondago Copper Co. has two drills exploring its recently acquired property in Ontonagon County north of Lake Gogebic. The Keweenaw Consolidated Company has two drills working north of the old Delaware property. Adventure has one drill sinking from the bottom of its 1500 foot shaft and plans to soon start another at the surface. The Algomah continued drilling to locate the Lake lode and put down several holes during the year. Isle Royale did some drilling in the horizon of the Kearsarge lode. Several mines used diamond drills underground during the year and there is a tendency to give increased attention to the probing of foot and hanging walls by diamond drill holes at frequent intervals. Much ore has been found in this way. At some mines drills are kept in con-

stant service on this work and very satisfactory results are obtained. Many years ago the advisability of constantly testing for ore bodies on either side of lodes being worked, was conclusively proven at the Quincy mine. Some properties however, have not yet been well tested in this way, and it is probable that very large additions to ore reserves will result from careful examination of ground on either side of old stopes. During 1912 very satisfactory results were obtained at South Kearsarge mine from deposits in the footwall, and it is likely that some other parts of the Kearsarge lode will show similar deposits.

The output for 1912 shows a falling off on the part of some of the larger producers and substantial increases by a few. The falling off was partly due to diminished values per ton and partly to decrease in tonnage. The decreased production resulted in some mines from ordinary stoping being in poorer parts of the lode; but in other cases it is partly to be charged against changes in method of mining which necessitated much dead work. The tonnage was in nearly all cases less than would have been mined if there had been sufficient men available.

Calumet & Hecla, Quincy, Baltic and Wolverine will show smaller output for 1912 than for the previous year. Ahmeek, Allouez, Centennial, Champion, Trimountain, Isle Royale, Superior, Tamarack, Franklin and Mass will show increased output. The total for the year was nearly the same as that for 1911. The smelter output increased from 219,840,201 pounds in 1911 to 231,112,228 pounds in 1912; but there was no corresponding increase in mine production.

At the Calumet & Hecla, the yield from conglomerate ore totaled much less than in 1911 and this was only partly made up by increased production of amygdaloid ore. The Quincy output fell off about 10%. The Baltic showed a somewhat larger decrease. The Wolverine mined some lower grade ore than usual during the summer and the total production was about 5% lower than in 1911.

The Ahmeek continued its very successful progress and is expected to make notable further increase when No. 3 and No. 4 shaft equipments are completed. Allouez began use of the new hoist at No. 2 shaft during the year and is still gradually increasing production. The year's operations netted the company a very substantial profit and leaves a balance of assets in place of one of liabilities. The Centennial managed to take advantage of good copper prices to some extent and was also a good money maker. The Champion and Trimountain both showed up well during the year and made up for the falling off of production by the Baltic—the third of the Copper Range trio. The Isle Royale showed evidence of its vastly improved condition and should soon become a much larger producer. The Superior developed a remark-

able second lode and, made some increase while preparing for greater output. The Franklin began the use of new hoisting equipment at No. 1 shaft and made a fairly large output though held back by shortage of men. The Mass also was equipped with additional facilities and shipped a large tonnage while continuing extensive development work. These two mines in 1912 were operated at a profit for the first time in years. The Winona and Victoria both felt the labor shortage acutely, and were unable to take full advantage of good prices.

During the past year, most of the mining companies elected to operate under the provisions of the Employer's Liability and Workmen's Compensation Act of Michigan, which became effective Sept. 1, 1912. The principles striven for in this act are: reasonable compensation at minimum cost for all accidents except the result of wilful fault, certainty of amount, certainty of payment; payment without litigation and prevention of accidents. Fixed sums are paid under the act for any injury which incapacitates an employe for a period of not less than two weeks. Amounts of compensation to be paid in case of death of employe is determined by the extent to which his immediate relatives have been dependent for support on his earnings. If the employe leaves dependents wholly dependent on him, the compensation for fatal injury is a weekly payment of one-half his average weekly wages, but not more than $10 nor less than $4 a week for 300 weeks. For complete disability the compensation is at the same rate for 500 weeks the total not to exceed $4,000.

As stated by the accident industrial board, "the theory of the compensation law is based on the assumption that when a worker is injured in an industry, the loss to him was occasioned by the industry, and that the product of that industry should be charged with his losses, and should pay for them. The law should be supported to the end that injured workmen may receive justice, that employers may have fixed liabilities and escape the embarrassment and expense of damage suits, that the courts be relieved of the time of trying damage suits, that the public treasury be relieved of the expense of these damage suits, that the public be relieved of the expense of caring for the victims of industrial accidents, that more harmonious relations be promoted between employers and employes."

ADVENTURE CONSOLIDATED COPPER CO.

Balance of assets January 1, 1913, $33,634.

During 1912, exploration was continued by crosscuts and drifts at a depth of 1,500 feet. Copper was encountered in several places in a long crosscut south of the shaft and drifts have been run to determine the nature of these deposits. They occur in ground that is much

crushed and the structure is too irregular to permit of easy correlation with the copper found in drill cores. Three lodes known as No. 2, No. 3 and No. 4 have been opened by drifts at the 1500-foot level, and another lode known as No. 1½ is being opened up at a depth of 1190 ft. No large body of good ore has yet been found. A diamond drill is now in operation at the bottom of the shaft, boring a vertical hole.

AHMEEK MINING COMPANY.

Balance of assets December 31, 1912, $1,379,209.34

The Ahmeek Mine during the past few years has made rapid increase in production with lower costs per pound of copper. In 1911 there was mined 617,204 tons of which 18,655 tons were discarded. The 598,549 tons of ore stamped yielded 15,196,127 pounds copper, or 25.4 pounds per ton, at a cost of 7.17 cents per pound. The net profit for the year was $870,272.94 and the company's first dividend, $2.00 per share, was paid on Nov. 1, 1911.

During 1911 all four shafts were deepened and reached respectively No. 1, 2,281 feet; No. 2, 2,410 feet; No. 3, 1,683 feet; No. 4, 1,687 feet from surface. Good ore was opened up at No. 1 and No. 2 shafts, while lower grade ore was found at No. 3 and No. 4 shafts.

During 1912, development has continued favorable and production considerably increased. Large profits have been made and $900,000 distributed in dividends. Foundations have been laid and the construction of buildings for permanent surface equipment at shafts No. 3 and No. 4 commenced. A rock house with a bin capacity of 2,500 tons in being erected. Material increase in production is to be expected when the new hoists are in operation. The mill is to be enlarged to accommodate four additional stamps, two of which will be contracted for early in 1913.

To determine whether mules can be used to advantage in tramming, two of these animals have been used to haul the cars on one of the levels. Their suitability is not yet proved, and their use at the Ahmeek at present is an experiment only.

During 1912, there was treated 652,260 tons of ore, yielding 16,455,769 pounds copper, or 25.2 pounds per ton at a cost of 7.85 cents. Net profit for the year was $1,465,396.89.

President R. L. Agassiz reports for 1912:

"At No. 1 shaft all openings to the north show ground of average quality. To the south, the same is true of the 15th, 16th and 17th levels, but the 6th, 10th and 14th levels have been poor throughout the year. The 8th level south passed through a disturbed area tributary to a Mohawkite seam, but the ground opened in the last two months of the year has been of average quality. At the end of the

year, the shaft showed five feet of good vein on the hanging-wall side. The experiment of tramming by mules is being made on the 12th level, and thus far is giving good results.

"At No. 2 shaft all the openings show average values. The 9th and 13th levels north reached the Mohawk boundary. A transverse fissure north of No. 2 shaft, carrying mass copper, has been opened up for a distance of 219 feet on the 10th level, for 60 feet on the 13th level and for 77 feet on the 14th level, and openings still look very well. The shaft is sinking in the foot-wall.

"At No. 3 and No. 4 shafts all openings at these shafts have shown average values for this end of the mine, as explained in last year's report. The shafts have been connected on the 10th level, and at the end of the year No. 3 was sinking in the lode with average values and No. 4 was in the foot-wall. On account of surface construction at these shafts, drifting was stopped in June and shaft sinking in September. Sinking will be resumed shortly, but not much work can be done until the permanent plant is in operation."

ALGOMAH MINING COMPANY.

Deficit on January 1, 1913, $12,299.58.

The Algomah, like the other properties of which Stephen R. Dow was president, suffered a considerable financial loss by the failure of Mr. Dow. The company was reorganized after the Dow failure in 1912, with the following officers:

President, R. M. Edwards.

Secretary, Albert L. Wyman.

Treasurer, Henry Holman.

These officers and John C. Watson, J. H. Rice and David E. Dow, directors.

During 1911 exploration was carried on from the shaft and by diamond drill. The drift at the first level was extended south to a point 850 feet from the shaft, and north to a point 1,200 feet from the shaft, or 900 feet south of the first level of the Lake Mine.

At the second level a crosscut was run into the hanging wall—a thick bed of trap.

During 1912 the crosscut has been extended through the trap and drifting done on an amygdaloid which overlies it. This bed contains some copper and is being explored north and south from the crosscut.

Diamond drilling has been carried on throughout the year in an effort to locate definitely the Lake lode. An assessment of $1.00 per share payable January 22, 1912, was called to provide $70,000 for continuation of development work.

By the failure of Mr. Dow the company lost $28,725 which should

have been in the treasury at that time. To meet the expenses of continuing explorations from August 1 to December 31, 1912, $12,000 was borrowed and this amount is being increased at the rate of approximately $3,000 per month.

President R. M. Edwards reports of the results of explorations: "A study of the drill cores has as yet given no satisfactory explanation of the conflicting results obtained. Apparently on the northwestern part of the property adjoining the Lake and South Lake in vicinity to drill holes Nos. 5, 6 and 7, there are copper deposits at considerable depth, but which way they dip and where they come to the surface is undetermined. Work on the Lake and South Lake properties which is proceeding as rapidly as possible will later throw light on these questions."

ALLOUEZ MINING COMPANY.

Balance of assets December 31, 1912, $93,564.

The Allouez Mine, after several years of exploration and development, has now entered on what is expected to be a long period of profitable operation. Large sums have been spent in opening up the Kearsarge lode and providing modern and extensive equipment for mining the ore. It is now possible to produce a much larger tonnage and the output is being considerably increased. A large profit is expected from operations during 1912 and lower costs will obtain in the future.

In 1911, the mine produced 294,646 tons of which 6,036 tons were discarded. There was stamped, 288,610 tons of ore yielding 4,780,494 pounds copper, an average of 16.56 pounds per ton. This copper cost 13.30 cents per pound.

During 1911 both shafts were deepened, No. 1 to 3,298 feet and No. 2 to 3,228.5 feet. The openings from No. 1 shaft showed ground of average quality.

Those from No. 2 showed unusually good ore.

At No. 2 shaft there has been recently completed a steel rock house, with large circular storage bins and two 24 inch by 48 inch rock crushers and dumping aprons. A hoisting engine capable of hoisting a 5-ton load from 6,075 feet on the lode, has also been installed.

During 1912 there was treated 333,618 tons ore, yielding 5,525,455 pounds refined copper or 16.56 pounds per ton, at a cost of 13.52 cents per pound. Net profit for the year was $171,264.

The management in reporting operations for the year states:

"The openings from No. 1 shaft have shown about average quality of ground. The shaft itself, after passing through a disturbed area, is bottomed in fair rock.

"The drifts north and south from No. 2 shaft have opened ground

fully up to the average of previous year. The shaft, sinking partly in the lode and partly in the foot-wall, showed poor ground during the first half of the year, but during the last half of the year a fair grade of rock was exposed.

"The equipment for No. 2 shaft mentioned in last year's report went into commission during the summer. All necessary railroad connections have been built and the plant is working very satisfactorily. The collar houses at both shafts have been extended to take care of the new man cars now in use. The extension to No. 1 boiler house and a new 120-foot smokestack have been finished and three fire-box boilers installed.

"During the year and pending the final adjustment of the 'milling plan,' charges for stamping were made at cost. The cost of construction was $66,438."

ARCADIAN COPPER COMPANY.

Succeeded by New Arcadian Copper Company.

ARNOLD MINING COMPANY.

Is still idle.

ASHBED MINING COMPANY.

Is still idle.

ATLANTIC MINING COMPANY.

Mine on Atlantic lode is idle. The mill has been in operation treating ore from the Superior Mine; but this custom work has been recently discontinued and the mill is now idle.

BALTIC MINING COMPANY.

Balance of assets December 31, 1912, $306,106.25.

The Baltic Mine had poor years in 1911 and 1912, compared with former years. In 1911 there was stamped 696,795 tons of ore which yielded 15,370,449 pounds copper, an average of 22.06 pounds per ton, at a cost of 9.09 cents per pound. The profit from operations was $530,214.99 and $500,000 was distributed in dividends. During 1912 less copper was produced but $700,000 was paid out.

General Manager F. A. Denton reported early in 1912 on the condition of the mine:

"The new openings at the bottom of No. 3 shaft continued poor, though there are indications of improvement. At the No. 2 shaft and also at No. 4 the year's drifting has been in very good ground. The output of stamp rock was less than last year, due to reduced pro-

ducts from shafts No. 3 and No. 5. As stated in my last report, it is proposed to gradually abandon No 5 shaft and handle its ground through No. 4. We are also making a more determined effort to extract our ground from the boundaries backward to the shafts for reasons of economy, safety and high extraction. While arranging openings to permit of this, our output suffers temporarily."

During 1912 operations yielded results below the average, but improvement is looked for. The company reports that the openings made during 1912 show distinct improvement, those at No. 2 shaft being exceptionally good.

At the mill preparations are being made for the installation of regrinding apparatus to be driven by low pressure turbines. Mr. A. H. Sawyer says in a recent issue of the Engineering and Mining Journal. "The old section of the Baltic mill at Redridge, Mich., which contains four Nordberg simple steam stamps, is being equipped with a regrinding plant divided into four units, one for each head. The plant is being built in the basement, previously not used, so that no alteration in the mill proper was necessary. Each unit consists of one 8 ft. by 30 in. and one 6ft. by 22 in. Hardinge mill and nine Wilfley concentrating tables. The middlings from the jigs and the middlings and tailings from the finishing tables are fed to the mills by gravity. The mills were built in the shops of the Champion Copper Co. at Painesdale, under the Hardinge patents, but important changes were made in the mechanical design. They will be driven by 50 and 25 h. p. motors, respectively, mounted on the same concrete foundations as the mills."

During 1912 there was stamped 652,433 tons ore yielding 13,373,961 pounds copper or 20.50 pounds per ton. This cost 10.94 cents per pound and was sold at 16.16 cents. Net profit for the year was $697,393 and $700,000 was distributed in dividends.

BOHEMIA MINING COMPANY.

Was idle during 1912.

CALUMET & HECLA MINING COMPANY.

On December 31, 1912, Cash and Quick Assets totaled $11,560,426.47.

Liabilities $844,012.16 in drafts and bills and accounts payable. Notes outstanding, $5,819,000.

During 1911 the company stamped 2,909,972 tons of ore yielding 74,130,977 copper, an average of 25.47 pounds per ton at a cost of 8.52 cents per pound. From the conglomerate lode there was stamped 1,924,480 tons ore yielding 58,469,399 pounds copper or 30.38 pounds per ton at a cost of 8.25 cents per pound. From the Osceola Amygdaloid

lode, there was stamped 985,492 tons ore yielding 15,661,578 pounds copper an average of 15.89 pounds per ton at a cost of 9.95 cents per pound. No ore from the Kearsarge lode was stamped.

On December 31, 1911, the operating shafts on the conglomerate lode had reached the following depths. Calumet No. 5 and 6, 6,155 ft.; Calumet No. 4, 7,995 ft.; Calumet No. 2, 6,186 ft.; Slope shaft, 1,588 ft.; Hecla No. 6, 7,578 ft.; Hecla No. 7, 7,666 ft.; South Hecla, No. 8, 6,102 ft.; South Hecla No. 9 and 10, 7,627 ft. During the year shaft and arch pillars were removed from the 27th to the 24th level at Hecla No. 2 shaft, from the 23rd to the 19th level at Hecla No. 3, and from the 9th to the 5th level at South Hecla No. 11.

The company states that the openings in the five forties continue to show ground of about average grade and that at Hecla and South Hecla branches of the ground opened is quite up to the average of 1910. The openings on the Osceola lode were up to the average and large quantities of good ore were found on the foot side of the lode. On the Kearsarge lode development work was continued at No. 21 shaft but no better ground was opened.

During 1912 work has proceeded much as in 1911 but, owing to higher metal prices, this has been a much more profitable year. The production is expected to be somewhat less, however, there being considerable falling off in output of conglomerate ore.

The recrushing plant started in February, 1909, has proven very successful and in 1911 there was treated 477,794 tons of tailings averaging 12.66 pounds copper yielding 2,152,110 pounds copper or 4.50 pounds per ton at a cost of 5.01 cents per pound. Construction of a new recrushing plant has been started. The foundation and nearly all the steel work for the building, 123 ft. by 432 ft., has been erected. The new plant will be equipped with Hardinge conical pebble mills. The regrinders in the plant now in operation are Chili mills.

After long experimentation, it has been decided to install an electric turbine generator to be driven by the exhaust steam from the stamps. Plans were made for a 7,500 kilowatt unit and contracts for the machinery have been awarded. The foundation and building for the generator are finished and part of the machinery is now on the ground.

During 1912 an important addition has been made at the smelter. Two furnaces designed to have a capacity of 150,000 to 175,000 pounds of refined copper have been built. These are to be run in 48-hour cycles—36 hours for melting and 12 hours for refining. Walker casting machines are used and the copper is cast in the form of anodes. The foundation for a new electrolytic building 155 ft. by 270 ft. has been finished and contracts for the steel work and part of the equipment

have been let. With this equipment in operation, it will be possible to recover the silver from smelter products at the Hubbel plant.

The company reports that before the close of the year, it acquired all the stock of the Frontenac, Manitou and St. Louis Companies and acquired the property of the Dana Copper Company. The lands formerly owned by the Manitou-Frontenac and Dana Companies will be known as the "Manitou-Frontenac Branch" and the lands of the St. Louis company as the "St. Louis Branch."

During 1912 on the conglomerate lode there was completed 523 ft. shaft sinking, 10,048 ft. drifts and 614 crosscuts and footwall drifts. Hecla shafts No. 6 and No. 7, were deepened from 7,578 and 7,666 ft. to 7,791.5 and 7,854.0 ft. respectively, and South Hecla shafts No. 9 and No. 10, from 7,627 to 7,740 ft.

President Shaw's report says:

"About 12 drills are at work in removing shaft pillars and about 15 drills in cleaning up arches or the 'backs' of old stopes. The drifts in the 5 forties and in the Hecla and South Hecla branches continue to open ground of about the same quality as last year."

On the Osceola lode there was completed 451.0 ft. shaft-sinking, 17,736.5 ft. drifting and 317.5 ft. crosscuts. Shafts No. 14 and No. 16 were deepened from 2,554 to 2,812 ft. and from 2,600 to 3,036 ft. respectively. President Shaw's report says: "There has been practically no change in the character of the openings made this year as compared with the previous year. The footside of the lode continues to yield a large tonnage of rock; fully 25% of the product last year having been mined from footwall stopes. The 6th and 10th levels north of No. 18 shaft have reached the Centennial boundary, and south of No. 13 shaft the 21st and all the levels above have been driven to the boundary of the Osceola Branch of the Osceola Mine. Stoping operations are now being conducted over the entire length of the lode, about 2⅓ miles."

On the Kearsarge lode No. 21 shaft was sunk 20 ft. to a depth of 2291 ft. and 2,120 ft. drifting was done. There was stamped 19,050 tons ore yielding 228,985 pounds copper. Pres. Shaw says of operations on this lode. "The development work at No. 21 shaft has been continued throughout the year, and though no materially better quality of ground has been opened, the rock is more generally mineralized."

During 1912 all the producing subsidiary companies, Allouez, Centennial, Isle Royale, Osceola, Superior and Tamarack made profits, the total amounting according to the Boston News Bureau to $3,758,900. Of this amount, the sum of $1,477,500 represents profit on shares held by the C. & H. Company. The company received $15 per share on 24,800 shares Ahmeek and $12 per share on 32,750 Osceola. Further

dividend of $7 per share on 24,800 shares Ahmeek and $1 per share on 27,500 Isle Royale will be paid early in 1913, making a total of $966,100. All these companies are in a much better financial position than a year ago. The ownership of shares in the several subsidiary companies was on Dec. 31, 1912 as follows:

	Shares issued.	Shares owned by C. & H. Co.
Ahmeek	50,000	24,200
Allouez	100,000	41,000
Centennial	90,000	41,500
Cliff	60,000	19,400
*Dana	40,000	40,000
*Frontenac	20,000	20,000
Gratiot	100,000	50,100
Isle Royale	150,000	30,500
La Salle	302,977	152,977
Laurium	40,000	37,550
*Manitou	20,000	20,000
Osceola	96,150	32,750
Seneca	20,000	11,207
Superior	100,000	50,100
*St. Louis	40,000	40,000
Tamarack	60,000	19,400
White Pine pfd	3,792	43,202
White Pine com	85,320	6,092

*The properties formerly held by these companies were in 1912 acquired by the Calumet and Hecla Mining Co.

In 1912 there was treated 2,806,610 tons ore yielding 67,856,429 pounds copper, an average of 24.18 pounds per ton. 1,746,960 tons Conglomerate ore treated yielded 51,935,245 pounds or 29.73 pounds per ton, at a cost of 8.87 cents per pound. 1,040,600 tons Osceola Amygdaloid ore treated yielded 15,692,199 pounds copper, an average of 15.08 per ton, at a cost of 10.36 pounds per ton. At the crushing plant 481,320 tons of coarse tailings, containing 12.86 pounds copper per ton yielded 2,155,292 pounds copper at a cost, exclusive of smelting and selling, of 4.99 cents. The extraction was 4.48 pounds copper per ton.

The balance sheet as of December 31, 1912 shows assets of $11,560,426.27 against which are charged drafts in transit, $495,260.88; Bills and accounts payable, $348,751.28; notes outstanding, $5,819,000.

During the year there was paid in dividends $4,200,000, making a total of $120,050,000 paid to December 31, 1912. Notes amounting to $2,700,000 were retired. A long period of profitable operation is assured for the Calumet & Hecla mine and the company seems likely to receive a liberal return on its investments in other properties.

CARP LAKE MINING COMPANY.

This company has recently resumed work on its long idle property in the Porcupine district and is expected to undertake more vigorous exploration next season.

CENTENNIAL COPPER COMPANY.

Balance of liabilities December 31, 1912, $3,549.22.

Development during 1911 resulted in the blocking out of considerable good ore in the northern lower part of the mine and the ore produced was mined at a profit. 86,543 tons were stamped producing 1,493,834 pounds copper, an average of 17.26 pounds per ton, at a cost of 12.69 cents per pound. The profit from operations was $12,411.97 and after deducting interest paid there resulted a net profit of $6,045.62 for the year.

During 1912 the production has been increased and the better price for copper taken advantage of. As in 1911, the most satisfactory results are being obtained in the north drifts from No. 2 shaft. No work was done at No. 1 shaft.

In 1912 there was stamped 106,517 tons ore, yielding 1,742,338 pounds of refined copper, an average of 16.36 pounds per ton, at a cost of 13.46 cents. Net profit for the year was $50,511.

CENTRAL MINE.

Idle.

CHALLENGE MINE.

Idle.

CHAMPION COPPER COMPANY.

Balance of assets December 31, 1912, $943,875.84.

The Champion Mine had a comparatively lean year in 1911, but has since improved greatly. In 1911 there were stamped 734,392 tons of ore yielding 15,639,426 pounds copper, an average of 21.296 pounds per ton at a cost of 9.63 cents per pound. The net profit for the year was $454,588.61 and $500,000 was distributed in dividends.

In 1912 increased production and better prices have resulted in large profits and $1,100,000 has been paid in dividends.

The mine is being developed to the south by long drifts and the territory is showing up well. To facilitate tramming, the mine is now electrically equipped and the cars are hauled to the shaft by motors.

General Manager F. W. Denton reported concerning operations in 1911.

"The reduced output of copper is explained by the lower yield, due probably to a combination of causes. The rock obtained from the drifting was not as rich as during the previous year, which was unusually good, and our stoping has been carried on in leaner rock. While the fluctuation in yield is larger than usual, there is nothing to indicate any serious change in the quality or extent of the ground. The mine is assured of a long and profitable life and has not yet reached its zenith."

The results obtained during 1912 were much better than in the previous year. 765,306 tons of ore was stamped, yielding 17,225,508 pounds of copper, or 22.508 pounds per ton. This cost 8.88 cents per pound and was sold at 16.16 cents. Net profit for the year was $1,251,619, and $1,100,000 was distributed in dividends. The company reports that openings made during 1912 were good at all of the shafts.

CHEROKEE COPPER COMPANY.

Idle.

CLARK MINE.

Idle.

CLIFF MINING COMPANY.

Balance of assets December 31, 1912, $62,571.79.

During 1911 exploration was carried on at a depth of 205 feet by drifts on a lode in the horizon of the Kearsarge amygdaloid. A second parallell lode has also been tested. President R. L. Agassiz reports of operations during 1912:

"The crosscut to the north was driven 154 feet west and encountered the west lode mentioned in last year's report at a distance of 160 ft. This lode was poor where cut and no copper was found in the 40 feet of drifting that was done to the north.

"Drifts on the east lode were extended 50 feet to the south and 288 feet to the north, but with the exception of a small amount of copper at one point, nothing of value was disclosed, the bed being only from 3 to 4 feet wide and poor throughout."

CONTACT COPPER COMPANY.

Balance of assets December 31, 1912, $17,866.

The Contact Copper Co. has continued diamond drilling exploration

begun in 1910. Although several amygdaloids and one conglomerate showed small amounts of copper, the beds thus far cut have shown no marked degree of mineralization.

In November, 1912, the company bought all the property of the Elm River Copper Company at public auction.

COPPER CROWN MINING COMPANY.

Idle.

DAKOTAH HEIGHTS COMPANY.

Was absorbed in 1912 by the Naumkeag Copper Co.

COPPER RANGE CONSOLIDATED COMPANY.

Surplus December 31, 1912, $904,137.63.

In 1911 comparatively small profits were made, the production of copper being less than in previous years and the selling price low. Much better results were obtained during 1912 however.

In the year 1911 there were produced 37,130,292 pounds of copper which was sold for $4,655,127.03. The net income was $804,560.93 and $1,357,104 was paid out in dividends.

The company has recently made a number of changes at the mines which are expected to improve the efficiency of the working force. Young engineers have been put in charge of much of the work formerly left to mining captains who had much practical experience but little technical education. One-man drills have taken the place of many of the two-man drills, enabling the company to pay higher wages and yet obtain the same tonnage at a much lower cost. Electric motors are now used to haul cars in the longer drifts. A number of the stations have been concreted. At the mills experiments with regrinding mills have been carried on for some time and the construction of a regrinding plant at Freda is now under way. Hardinge conical pebble mills will be used to regrind the sands. Experiments with low pressure turbines to use exhaust steam from the stamps have proven the economy of such practice, and a turbine has been installed to develop the power needed for the new regrinding apparatus.

The past year has proven much more profitable than did 1911, owing to better prices and increase in output of the Champion and Trimountain mines. The Baltic made a lower production than usual however, and the total tonnage was therefore not much increased. The company paid in dividends $788,428 and ended the year with a substantial increase in balance of assets. The income was largely derived from profits made by the Champion, Baltic and Trimountain mining Com-

panies. The Champion paid $1,100,000 during 1912, half of which went to St. Mary's Canal Mineral Land Co. The Baltic paid $700,000 and Trimountain paid $300,000.

The report for 1912 shows that the company's net income was $1,692,566. There was produced 28,967,428 pounds copper at an average cost of 10.51 cents. This copper was sold at 16.16 cents per pound. The average yield per ton was 21.07 pounds of refined copper. The three mines, Baltic, Champion and Trimountain, together produced 37,584,647 pounds copper but only one-half of the Champion is owned by The Copper Range Consolidated Co.

COPPER RANGE COMPANY.

This company owning one-half of the stock of the Champion Copper Co., had a very successful year in 1912. See Champion Copper Co. and Copper Range Consolidated Co. reports.

DANA COPPER COMPANY.

The property was acquired by the Calumet & Hecla Mining Co. and with that of the Frontenac and Manitou companies will be known as the "Manitou-Frontenac branch."

ELM RIVER COPPER COMPANY.

In November all the property was sold at public auction to the Contact Copper Company. The Elm River Copper Company is dissolved and in process of liquidation.

FRANKLIN MINING COMPANY.

Balance of assets December 31, 1912, $41,839.

The failure of the president, Stephen R. Dow, in September, 1912, resulted in severe financial loss to the company. Mr. Dow had used the company's funds in his private business and was unable to return them. The company has been reorganized, Mr. R. M. Edwards, elected president, and Charles G. Rice and Sidney J. Jennings elected to succeed Mr. Dow and Albert Wyman. An assessment of $2 per share was called to provide money to carry on development and construction work.

Aside from the Dow affair and inability to produce the desired tonnage the company has been fairly successful in 1912. New equipment has been put in operation and the mine openings were in better ore than usual. Long stretches of good ore have been developed and the lower levels are regarded as the best in the mine. From the opera-

ting shaft a long drift has been run south on the twenty-third level to make connection with No. 3 shaft by raising to the 17th level.

During 1911 there was produced 820,203 pounds copper. The production since the completion of new equipment in February, 1912 has been greatly increased and will be further increased as miners can be secured. Owing to labor troubles however the company has not been able to produce a tonnage near that which the plans call for.

To facilitate handling of the ore, loading chutes have been built at the 31st level for all ore from 31st to 27th level and at the 27th level for the six levels above. Instead of filling the skips at each level, the ore is run down through rock chutes to bins from which it is readily drawn off, a skip-load at a time, to a loading bin from which it is then allowed to run into the skip.

The hoist at the operating shaft is of a new type designed by Manager R. M. Edwards. He describes it as follows:

"The new hoisting engine, built to handle a skip carrying ten tons of rock at a depth of 5,000 feet, has been installed and is working. This engine has an air cylinder connected tandem with each of the two steam cylinders. In hoisting, these air cylinders are unloaded and do no work. On lowering, the steam cylinders are unloaded, the weight of the descending skip turns the engine backwards, the air cylinders are brought into play and furnish resistance necessary to brake the skip on the down trip by compressing air. This air is discharged into the large receivers above mentioned, where it mixes with steam from the boilers and is fed back to the hoist to assist in raising the next skip. The engine was designed to utilize the power generated by the descending skip without the cost of sinking a double compartment shaft and building and maintaining two skip-roads, to avoid the loss of two skips in balance when the empty skip must go to the bottom of the mine in order to get the loaded skip to the dump, and be afterwards hoisted to the level on which it is to be loaded and for a saving in brake shoes. Is has done these things."

In addition to new equipment at the mine, numerous improvements have been made at the mill. New machinery has been installed and much of the old overhauled or rebuilt. An increase in recovery at lower cost is now obtained.

In 1912 there was stamped 176,462 tons, giving 1,710,651 pounds of refined copper, or 9.80 pounds copper per ton.

The company lost $81,393.62 through the failure of S. R. Dow.

FRONTENAC COPPER COMPANY.

Idle.

GLOBE MINE.

Idle.

GRATIOT MINING COMPANY.

Balance of liabilities December 31, 1912, $358,510.57.

No active operations were conducted during 1912. Expenses amounted to $21,554.71 of which $17,688.71 was interest. Receipts from sales of machinery, etc., amounted to $8,584.86.

HANCOCK CONSOLIDATED MINING COMPANY.

The Hancock Mine, after several years of development work, is now nearing the producing stage. During 1911 a test was made of the No. 2 and No. 3 lodes, while No. 2 shaft was being sunk to open up the Pewabic series of lodes. The mill test extended over a period of six and a half months and resulted in the recovery of 18.21 pounds copper per ton of ore stamped. 754,749 pounds copper was produced and sold.

In 1912 the No. 2 shaft was deepened to 4,000 feet. The shaft has cut three promising lodes known as No. 4, No. 5 and No. 6. To open up No. 4 lode, crosscuts were run from the shaft at 26th and 34th levels and others will be run at 36th and 39th levels. Another lode has been recently exposed in a crosscut at the 18th level.

It is expected that the mine will be in shape to begin shipping ore in 1913 and arrangements have been made for the use of one of the stamps of the Lake Milling, Smelting & Refining Company's plant at Point Mills.

Four assessments of $1.00 each were paid on March 1, 1911, May 1, 1911, January 10, 1912 and March 28, 1912, respectively. To provide any further funds that may be needed, arrangements have been made to borrow money instead of making further assessments. If the lodes prove up well, the mine will very soon be self-supporting for it is well equipped to handle a large tonnage.

In the annual report for 1912 General Manager Harris says:

"The principal development work done during the year was confined to the opening of new ground by drifting on No. 3 lode at the 16th, 18th and 27th levels; to driving crosscuts east from the 13th, 18th, 27th, and 34th levels to develop the veins interested at depth in No. 2 shaft; and to the sinking of No. 2 shaft to the objective point, as originally planned.

"Some development work was done during the latter part of the year on a promising looking amygdaloid lode intersected by the 18th level crosscut 735 feet of No. 3 lode, and although the vein is narrow, carrying in width from three to eight feet, it is well mineralized for the entire distance:—150 feet south and 50 feet north of crosscut respectively.

"Drifting will be done on this lode where intersected by crosscuts

at the 13th, 27th and 34th levels, and judging from results in the limited amount of drifting done to date, at the 18th level, should be a valuable asset. Crosscuts from the 13th to the 34th level inclusive will command a length of 1,800 feet on the dip of the lode.

"No. 2 shaft was sunk and timbered 804 feet to a point 4,001 feet below the collar. Shaft was bottomed at this depth October 18, since which time work in shaft has been confined to cutting the four necessary stations below the 34th level station, viz: at the 39th, 44th, 49th and 53rd levels, respectively.

"Very good progress was made during the year in sinking the shaft, and in cutting the stations. Four of these stations are completed.

Several of the groups of veins where intersected in the shaft, at and below 3,105 feet, were well mineralized."

HOME COPPER MINING COMPANY.

Idle.

HULBERT MINING COMPANY.

Idle.

HUMBOLDT COPPER COMPANY.

Idle.

HOUGHTON COPPER COMPANY.

During 1912 the results of the exploration have been very good. As the shaft has been found to be too far in the foot wall, it was discontinued at the 623-foot level. A winze has been sunk 200 feet from this level in the lode and disclosed good ore. Drifts north and south have also shown much copper. The ore is very similar to that of the main lode at the Superior Mine and which is supposedly a much altered portion of the Baltic lode.

Owing to the remarkably successful opening up of the west lode at the Superior Mine, some exploration for this lode has been done at the Houghton. Comparatively little has yet been done. The present openings are not very promising, and attention is chiefly confined to the Superior lode.

At the 623-foot level the drifts are being extended and at the 825-foot level drifting has recently been started.

INDIANA MINING COMPANY.

Surplus of assets December 31, 1912, $53,060.23.

The Indiana, like other properties in which he was interested, suffered

A. MACHINE DRILL CONTEST, CALUMET, 1912. A TWO-MAN MACHINE RUNNING.

B. WHITE PINE NO. 2, TEMPORARY SHAFT.

C. COLLARHOUSE, KEARSARGE MINE, DRILL CAR AT THE RIGHT.

A. MAKING CONCRETE COLLAR, NEW SHAFT AT NORTH LAKE MINE, 1912, ONTONAGON COUNTY.

B. CRUSHER FEED, FRANKLIN JR. MINE, NO. 1 SHAFT.

C. NEW HOIST AT FRANKLIN JR. MINE, NO. 1 SHAFT.

A. COOLING AND LOADING INGOTS, MICHIGAN SMELTER.

B. REVERBERATORY FURNACE, MICHIGAN SMELTER.

C. POURING SLAG, MICHIGAN SMELTER.

A. AIR ENGINE, VICTORIA MINE.

B. NONESUCH MINE, ONTONAGON COUNTY, 1912.

C. STARTING EXCAVATION FOR SHAFT AT SOUTH LAKE MINE, 1912.

by the failure of President Dow, but the development work has continued without interruption. Messrs. Charles G. Rice, Sidney J. Jennings and Albert F. Holden have been elected directors to succeed Stephen R. Dow, David E. Dow and Albert L. Wyman. To provide funds to replace the losses made by President Dow, an assessment of $1 per share was called October 16, 1912.

Shaft sinking has been carried on at a fast rate in spite of the rock being unusually hard to drill. For a considerable distance the shaft is in felsite, a very hard rock which has not been encountered in other Michigan copper mines except as boulders in conglomerates.

At a depth of 600 feet, a crosscut was run in to explore a deposit at the bottom of the first felsite mass cut in the shaft. A short drift showed some heavy copper in a much altered margin of the felsite just above a mud seam which separates the felsite from a crushed brown colored trap. The deposit was only opened up for a short distance and then this exploration was discontinued.

In December, 1912 the shaft had been sunk to a depth of over 1,200 feet through felsites, sandstones, traps and amygdaloids. Copper has been found in some of the amygdaloids and in seams in the traps. At a depth of 1,115 feet, a quantity of green copper minerals, carbonate and silicate, was found in the felsite. A little native copper occurs with the green minerals.

As quickly as possible, the shaft is being sunk to open up the deposit from which a remarkable showing of copper was obtained by drilling at a depth of over 1,400 feet.

A number of interesting structural features have been determined while sinking the shaft. In the felsite there is a clay seam which was followed down for a long distance by the shaft. It was wide in the felsite but did not continue into the underlying trap. Mr. Bennett states that so far as could be determined in the shaft, the bedding of the sandstone shows a dip to the northeast instead of to the northwest. The contact between the first felsite and the underlying trap dips to the northeast. The top of the second felsite however slopes to the northwest. In the trap between the felsites there were found almost flat veins, a few inches wide, containing copper with well crystallized calcite. A similar seam at the contact with sandstone showed some native silver and fluorite in addition to copper and calcite.

ISLAND COPPER COMPANY.

Idle.

ISLE ROYALE COPPER COMPANY.

Balance of assets December 31, 1912, $557,743.48.

The mine has shown remarkable improvement in the last few years and in spite of the low price of copper in 1911, a profit of $156,708.10 was made. There was stamped 457,440 tons ore yielding 7,490,120 pounds of copper, an average of 16.4 pounds per ton, at a cost of 10.85 cents per ton. Considerable sorting was done at the mine and of the rock broken, there was discarded 106,970 tons or 19 per cent. The four operating shafts on the Isle Royale lode were all deepened, No. 2 to 3, 162 feet, No. 4 to 1,517.5 feet, No. 5 to 1,006 feet and No. 6 to 1,234.5 feet. At "A" shaft, an exploration at a lower horizon, a little drifting and crosscutting was done.

During 1912 very satisfactory progress has been made and preparations for substantial increase in output are now well under way. The mine has been opened up more extensively and a new shaft is being cut by sinking and raising. This shaft is south of No. 6 and will command a portion of the lode which has shown up well where opened by long drifts south from No. 6. Raising from these drifts has been started at the 3d, 5th and 7th levels. Sinking from the surface through the overburden was begun but is temporarily stopped. With No. 7 shaft in operation and increased milling facilities a very much greater tonnage can be handled.

Arrangements have been made to purchase for the sum of $140,000 a stock interest in the Lake Milling, Smelting & Refining Company which will assure to the company the use of two stamps. A spur connecting the Isle Royale Ry. with the Mineral Range Ry. has recently been constructed and shipments to the plant at Point Mills will be possible early in 1913.

In addition to the development of the Isle Royale lode, some exploratory work on other lodes has been done in 1912. At No. 2 shaft, the Grand Portage lode has been opened up for a short distance at the 29th level. In the horizon of the Kearsarge lode, some surface trenching has been carried on during the summer. The developments at the Houghton Mine will also likely lead to exploration in the horizon of the Baltic lode on Isle Royale property.

During 1912 there was stamped 531,105 tons, yielding 8,186,957 pounds of copper, or 15.4 pounds per ton, at a cost of 11.89 cents per pound. Net profit for the year was $419,766.

President Agassiz in his report describes recent results of openings on Grand Portage lode and exploration in horizon of Kearsarge lode as follows:

"On the 29th level at a point 700 feet north of No. 2 shaft a crosscut was driven to the west and at a distance of 125 feet it cut the West

or Grand Portage lode, which was found to be 62 feet wide with 14 feet of good copper ground on the foot side and about 13 feet on the hanging side, with the middle of the vein poor. A drill hole 70 feet north of the shaft on the same level showed this vein to carry some copper, and a crosscut has been started at this point. A second drill hole 380 feet north on the 26th level shows good vein matter but no copper values.

"This West or Grand Portage lode was mined by your company in the early days from No. 1 shaft, which has since been abandoned; the results of that work, together with this recent development, made the acquisition of additional territory desirable, and your company has bought, subject to title, the mineral rights underlying the Montezuma lands, approximately 200 acres, for the sum of $100,000, in four payments of $25,000 each, extending over a period of three years. These mineral rights, which your directors believe of value to the company, lie below No. 1 shaft to the north of No. 2 shaft and below the 29th level, and can be mined in large part through No. 2 shaft."

"Exploration by drilling and trenching was undertaken on the supposed horizon of the Kearsarge lode at a point about 2,400 feet from the Isle Royale lode, and directly north from the Huron dam on the S. E. ¼ of the N. E. ¼ of Section 2, and an amygdaloid lode was encountered, which, in the opinion of experts, was the Kearsarge lode. Though some mineralization was shown, no commercial values were found. At a point about 700 feet farther north in the hanging, diamond drilling and trenching disclosed a second amygdaloid vein, which carried good copper values near the surface, but at depth showed poor vein matter with no copper."

KEWEENAW COPPER COMPANY.

On September 3, 1912, this Company offered the stockholders of Phoenix Consolidated Copper Company and the Washington Copper Mining Company an opportunity to exchange their shares of stock in these companies for shares of stock in the Keweenaw Copper Com pany, on the following basis:

Ten shares of Phoenix for one share of Keweenaw.

Twenty shares of Washington for one share of Keweenaw.

When this exchange of stock is completed the Keweenaw Copper Company will own, including the Ashbed on the lands of the Phoenix Consolidated Copper Company, about thirteen and one-half miles along the strike of the Ashbed lode.

In the past, mining operations on this lode have been conducted on a limited scale and it is believed by the Board of Directors that by extensive developments, that operations on this lode will be pro-

fitable, therefore, it has been decided to begin an active campaign of development.

Additional territory, amounting to approximately 5,682 acres have been secured for the Keweenaw Copper Company.

In order to pay for the additional territory acquired, liquidate outstanding indebtedness and provide funds for explorations, an assessment of $2.00 per share has been called.

In December exploratory work, consisting of diamond drilling was commenced, and it is proposed to thoroughly explore the Ashbed lode on the company's lands.

Officers of the company are as follows:

T. F. Cole, President.
Spencer R. Hill, Vice-president.
Thomas Hoatson, Second Vice-president.
C. A. Wright, Secretary and treasurer.
W. J. Uren, General Manager.

Directors:

T. F. Cole, Duluth, Minn.
G. G. Hartley, Duluth, Minn.
James Hoatson, Calumet, Mich.
Thomas Hoatson, Calumet, Mich.
Spencer R. Hill, Boston, Mass.
C. A. Wright, Calumet, Mich.

President T. F. Cole says in his report for 1912:

"During November contract was made for approximately 12,000 feet of diamond drilling on the Ashbed lode and in December the contractor commenced drilling operations with two drills on Section 11, T. 58 N., R. 30 W. The depth of holes on December 31, 1912, was as follows:

"Hole No. 38, 283.5 feet; hole No. 39, 49.0 feet and at these depths had not reached the Ashbed lode.

"The company now controls about 13½ miles along the strike line of the Ashbed lode, and now that exploration is well under way it is proposed for this year to continue diamond drilling along this lode in an easterly direction, and it is hoped that the results obtained will justify us in commencing mining operations.

"The directors were authorized to sell the company's timber at the last annual meeting of stockholders, but as yet no sales have been made.

"The Keweenaw Central railroad was operated at a loss during the past year. Improvement in its earnings is now being shown and it is only a question of time before the territory served by the railroad is

opened up and developed when the railroad operations will yield a profit."

LA SALLE COPPER COMPANY.

Balance of Assets December 31, 1911, $261,783.84.

The property has not been very greatly developed recently. During 1911 the new openings were of average character, but the low price of copper did not promise a profit. On Nov. 24, 1911, the following statement was issued by the directors:

"The ground so far opened necessitates a reasonably large tonnage to secure profits at a fair price of copper. The area developed on the Kearsarge lode contiguous to No. 1 shaft, is now adequate for such a tonnage, but the present low price of copper and the lack of suitable stamping facilities make production at a profit impossible. While No. 1 shaft is being suitably equipped, the expense of further development work can well be deferred until conditions warrant production and steps are being taken to temporarily discontinue operations at this point. It is proposed to do some exploratory work on your property east of the Kearsarge lode."

It is now planned to move the equipment from No. 5 and No. 6 shafts to No. 1 and No. 2. Sinking will be resumed at No. 2 and openings extended at No. 1. If the present price of copper holds profitable, production may result from operations in 1913.

President Shaw reports for the year 1912 as follows:

"With the higher prices of copper obtaining it was planned to resume operations last June, but it was impossible to secure a sufficient working force until November.

"The work of unwatering No. 1 shaft, has gone forward satisfactorily, and on December 31 the water level stood 1319 feet from surface, or 90 feet below the 12th level.

"No. 2 shaft is also unwatered, and on Dec. 31 the water was lowered to a point 1,586 feet below surface, or 70 feet below the 15th level.

"A cross-section of the formation was made by diamond drilling from a point on the Kearsarge lode 1,650 feet south of No. 2 shaft to the eastern boundary of the company's property. The line of the cross-section was at right angles to the formation, and a total of 322 feet of drilling was done. The work showed this entire zone to be barren of copper, and of the several lodes cut only one of them contained even fair-looking vein matter.

"The shaft houses from Nos. 5 and 6 shafts have been moved to Nos. 1 and 2 shafts, and the erection of the one at No. 2 is nearly completed. The present hoisting equipment will answer for a short time, but larger hoists will probably be installed in the summer."

LAURIUM MINING COMPANY.

Balance of Assets December 31, 1912, $18,465.42.

Exploration has continued at No. 1 shaft which on December 31, 1912, had reached a depth of 144.4 feet. During 1912 there was accomplished 317.5 feet of sinking and 2,324.7 feet of drifting. The company reported that towards the end of the year there was a slight improvement in copper values. In 1912 the drifting, confined to 11th, 12th and 13th levels showed poorer ground than opened in 1911. The shaft was deepened 114.4 feet and 3, 553.9 feet drifting was done during 1912.

MANITOU MINING COMPANY.

The property was merged with that of the Keweenaw Copper Co. in 1912 and will be explored by diamond drilling.

LAKE COPPER COMPANY.

Balance of assets April 30, 1912, $87,512.91.

Extensive development work has been carried on at the Lake Mine during the past few years and equipment for mining on a large scale has been installed. In March 1912 shipments of ore to the Baltic Mill were begun. These shipments were made to clear a way for the railroad extension to No. 2 shaft and consisted of about 300 tons per day. Recently the shipments from the mine have been increased somewhat but the output is as yet far below the hoisting capacity. The early shipments gave a recovery of about 15.6 pounds copper per ton. No mass was included. Higher recovery has been obtained from more recent shipments. Owing to lack of men, it has not been possible to increase the production and, in December, the output is still about 300 tons per month.

The equipment at No. 2 shaft was completed during 1912 and the old No. 1 shaft has been dismantled. The new rock-house is a large steel building with corrugated iron covering, 124 feet high to the sheave wheels. The ore bin is a circular steel tank 40 feet in diameter and 51 feet high. A second bin, 9 feet by 40 feet, is used to hold rock for concrete. The new hoist is a 32 inch by 72 inch first motion engine of Norberg make with a double conical drum capable of hoisting ten-ton loads from a depth of 5,000 feet.

In preparation for mining on a large scale, "cutting out" drifts have been run on several levels and rock walls, similar to those at the Baltic Mine, built to enclose and protect the levels. The ore will be mined by the Baltic method if a trial proves satisfactory.

The lode has been found to curve greatly and while striking nearly north at No. 1 shaft, it swings around to nearly due west and strikes

directly towards the South Lake property. It has been found that much of the ore is near the foot instead of the hanging and several of the recent drifts follow the foot more closely. The footwall rock is an ophite which is rather readily identified. The hanging wall is more regular, but is not easily distinguished from barren parts of the lode.

Encouraging results have been obtained by exploration of the East lode. This is a narrow lode which has now been opened up by short drifts on several levels. In places it is thin and poor, but several openings show good ore.

The main lode is now extensively developed and the mine should be a much larger producer in 1913. At present a shortage of labor holds back production.

LAKE MILLING, SMELTING & REFINING COMPANY.

In the company's plant at Point Mills there was stamped in 1911, 436,919 tons of ore. For this work the company received $124,082.32 and made a profit of $28,813.29 after paying taxes and spending $3,802.03 for construction. The cost of stamping 436,919 tons was $88,363.46 or about 21.8 cents per ton.

An arrangement has been made to purchase from the Tamarack Mining Co. its two-stamp mill and stock of the Mutual Water, Light and Power Co., which company owns the pumping and lighting equipment of the Osceola and Tamarack Mills. The purchase price will be $230,000. Mr. Quincy A. Shaw reports on the project as follows:

'If this purchase can be made it is planned to remodel these two Tamarack heads, to erect one to three new heads as required, and to remodel two or three of the old heads at the present stamp mill. As fast as the new Tamarack heads are put in commission, at least, an equal number of heads at the present stamp mill will be free for stamping rock from other mines. The present mill site at Point Mills is well located for the shipment of rock from the Superior, Isle Royale and Hancock mines. The present capital stock of the Lake Milling, Smelting and Refining Co., 100,000 shares, which is all owned by the Allouez and Centennial, will be increased to 250,000 shares and 108,000 shares will be sold from time to time to the above-named mines at such prices and in such amounts as conditions warrant, in order to secure funds for this portion of the Tamarack Mill side as well as for the necessary remodeling and erection of new heads.

"The cost of transportation of rock from the mines to the present stamp-mill is a large item in the cost of copper, and this new location will reduce the charges on Centennial and Allouez rock. The plan reserves to Allouez and Centennial a stock interest which assures the right to five stamps and involves no expense, unless at some future

time stamping capacity in addition to these five heads is required."

During 1912 preparations have been made to carry out the plans above outlined and they will be in effect in the coming year.

Regarding changes made during 1912, the management reports:

"During the past year Nos. 2 and 3 heads have been remodeled. No. 3 head began stamping Allouez rock on Nov. 11 and No. 2 head should be finished early in March. The wash equipment for both these heads duplicates in general that already in use at Nos. 4, 5 and 6, with the exception that Hardinge conical pebble mills are used instead of Chilean mills. At No. 2 head, space has been allowed for the installation of additional pebble mills in order to secure more economical treatment of Superior rock. An additional boiler has been placed in the boiler house.

"The present location of the boiler house is poor as regards possible extension, disposal of ashes, etc., and a new boiler house will be built on higher ground to the north of the mill. The building will be 51 by 125 feet with a capacity of ten boilers, and contracts for the steel have been given. Foundations have been built for an extension to the mill on the southwest, to be used as a mineral house, which will greatly facilitate the handling of mineral and permit the use of large cars.

"The girders of the steel trestle which connects the new railroad embankment with the mill were found too weak to support the weight of the present locomotives, and additional steel bents with concrete foundations are being put in."

LAKE SHORE MINING COMPANY.

Idle.

LAKE SUPERIOR COPPER COMPANY

Idle.

LAKE SUPERIOR SMELTING CO.

This company treats at its plant at Dollar Bay, the products of the Osceola, Tamarack, Isle Royale and Ahmeek mines. The charges for smelting Osceola concentrates varied during 1911 from $6.50 to $6.80 per ton of mineral. Profits made by the company were in large part used for construction and improvements at the works.

MASS CONSOLIDATED MINING COMPANY.

Balance of assets December 31, 1912, $9,347.76.

The mine has during the past few years, been extensively opened up

and equipped for larger production and is now operating at a profit. During 1911 there was produced, largely from development work, and stamped, 73,475 tons of ore yielding 1,326,898 pounds of copper, an average of 17.58 pounds per ton. The rock broken is lower grade but much waste is sorted out in the mine. The results obtained show that careful sorting pays. The work during 1911 and 1912 has been almost entirely on the Butler lode which has been proved to contain long stretches of fairly good ore.

The present operating shafts are "B" and "C." The "A" shaft is no longer used for hoisting as the tributary workings have been connected with "B" shaft at the 6th and 10th levels, and the ore is more economically handled at one shaft.

At "B" shaft there was completed during 1911, 2,503 feet of drifting and at "C" shaft 3,774 feet. The promising character of these openings is indicated by Manager Walker's report.

At "B" shaft development work has been done, on the Butler lode at the 6th, 10th, 11th, 13th and 14th levels and on the Evergreen lode at the 2nd, 6th, 9th and 11th levels. Both lodes have shown favorable stoping ground and the ore reserves have been materially added to.

At "C" shaft, development work has been carried on principally in the Butler lode on the 4th, 5th, 7th, 8th, and 9th levels and the shaft has been sunk an additional 152 feet to the 10th level. The shaft is now bottomed at a depth of 1,275 feet on the incline. The ground opened has been almost uniformly of good grade. The shaft itself was mostly in the lode and showed good copper values as far as it was sunk.

During 1912 these openings have been extended with results similar to those obtained in 1911. "C" shaft has been equipped with a new hoist and rock-house and the production has been increased to about 622 tons per day. A further increase will be made when men are available.

In May, 1912, a meeting of stockholders was held to consider the advisability of selling a portion of the company's lands. It is proposed to organize a new company to take over this land, the stockholders of the Mass company being given the right to subscribe to the new stock. This sale would furnish the Mass company with a satisfactory cash balance for construction and development purposes.

In 1912 there was stamped 132,891 tons of ore yielding 2,045,006 pounds of copper or 15.39 pounds per ton. The cost per pound during the first five months of the year was 18.308 cents, but during the last five months it was 14.462 cents.

The president, J. W. Linnell, states in his report for 1912:

"Your directors feel that they are now justified in expressing to you

their opinion that your mine has entered the list of "Successful Producers" and henceforth we will be able to produce copper at a cost below the price at which the metal may reasonably be expected to sell."

Superintendent E. W. Walker reports that:

"At "B" shaft development work has been done on the Butler lode at the 8th, 11th and 13th levels, and on the Evergreen lode at the 6th and 8th levels. As these Evergreen drifts have been driven to the westward, a material change for the better has occurred in that a considerably greater amount o' stamp rock is present in the lode.

"A raise has been put up from the 17th level at an angle of 45° to intersect the Butler lode. This raise is now in the lode at what is approximately the 16th level and shows the lode to be well mineralized and containing a considerable amount of heavy mass copper. The lode also appears to be wider, and, if with further development, these conditions prove to be permanent, it will mean a great deal to the future of the mine as the deepest point previously opened on the Butler lode was at the 14th level.

"At "C" shaft, development has been carried on almost entirely in the Butler lode at the 5th, 7th, 8th and 9th levels. The 5th and 7th levels have been extended a distance of 1,000 feet west from the shaft, and the results have been very satisfactory especially as this is all virgin territory."

Consulting Engineer F. W. Sperr, says: "I believe the mine is capable of producing at twice the rate of the last five months for many years to come; and that the items of cost can be further reduced."

MAYFLOWER MINING COMPANY.

Balance of assets December 31, 1912, $55,646.

Remarkably good results have been obtained by diamond drill explorations during the past two years and, so far as can be determined by drill cores, the company has discovered a thick lode of good ore. During 1911 there were completed three inclined holes, No. 13, 1,846 feet, No. 14, 1,252 feet and No. 15, 1,676 feet and two vertical holes, No. 16, 1,561 feet and No. 17, 1,354 feet. The results obtained by this exploratory work are given by Supt. Geo. Goodale.

"Aside from the mineral values established, probably the most important development of the year's work is the identification of the so-called St. Louis amygdaloid and the St. Louis conglomerate. This latter bed outcrops near the northeast corner of Section 8, and its location across the entire property is established within comparatively narrow limits. The dip of the formations is approximately 50 degrees, and the strike, as so far developed, conforms to a gradual curve, being

N. 18½ degrees E. near the southern boundary and increasing to N. 26 degrees E. in the central portion of the property.

"No. 13 hole encountered the St. Louis conglomerate between 1,121 feet and 1,155 feet. Below this horizon the ground was broken and much disorganized, which made diamond drilling a slow and tedious operation, necessitating considerable cementing. Work at this point was finally discontinued at a depth of 1,846 feet.

"No. 14 hole, between the limits 839 feet and 859 feet, cut an amygdaloidal formation which apparently bears a close relation to the copper-bearing amygdaloid previously disclosed in No. 11 hole. This formation exhibits mineralization between 842 feet and 859 feet, that portion between 850 feet and 859 feet showing a fair amount of fine copper continuously distributed.

"No. 15 hole encountered the St. Louis conglomerate from 653 feet to 704 feet. This hole developed two mineralized zones, the most promising of which extends from 1,126 feet to 1,287 feet. This appears to be a more or less mixed trap and amygdaloidal formation. The mineralization appears in the form of "heavy," "small" and "fine" copper and is shown in 48 pieces of the core extending from 1,128 feet to 1,286 feet.

"No. 16 hole disclosed the St. Louis conglomerate between 252 feet and 316 feet, and at greater depths cut two copper-bearing amygdaloidal formations. The first of these, extending from 1,211 feet to 1,239 feet, shows "heavy," "small" and "fine" copper quite uniformly distributed throughout the whole width. This mineralization is of good character and appears in quantity sufficient for commercial exploitation. The lower formation extends from 1,328 feet to 1,443 feet. The portion of this bed below 1,405 feet shows little more than slight mineralization, but that part between 1,328 feet and 1,405 feet indicates an exceptionally rich average value, the mineralization occurring in the form of "heavy," "small," "fine" and "shot" copper quite thoroughly distributed, except in two small, trappy sections.

"No. 17 hole cut the St. Louis conglomerate between 24 feet and 39 feet, at which point it appears as a more or less altered sandstone. At a depth of 948 feet, this hole entered what is apparently the minerized zone shown in hole No. 16, and disclosed this formation as a mixed amygdaloid and trap extending from 948 feet to 1,109 feet. The mineralization is not so "showy" as in No. 16 hole, but portions of the formation exhibit a thorough impregnation with copper of the "small" and "fine" and "heavy" grades. Fifteen assays of the drill cuttings from this formation, between 1,016 feet and 1,088 feet, show copper percentages varying between 0.63 per cent and 3.54 per cent the average for the 72 feet (which includes barren and trappy portions) being 1.33

per cent copper, equal to 26.6 pounds of metallic copper to the ton of rock. This hole was completed at a depth of 1,354 feet on March 5, and drilling in No. 18 hole is expected to begin on March 13th.

"There can be no question of the identity of the mineralized formation, shown in Holes Nos. 16 and 17, and the relation between this bed and the mineralized formation described in Hole No. 15 is very close, and this should be proven by Hole No. 18, located between holes Nos. 16 and 15.

"No possible connection can be established between the Mayflower lode, cut by Holes 15, 16 and 17, and the St. Louis amygdaloid, which is under investigation further south, as the Mayflower lode is several hundred feet geologically below the St. Louis conglomerate, while the St. Louis amygdaloid is several hundred feet above that conglomerate."

During 1912 two drills have been in operation and several additional holes have cut the Mayflower lode. Some of the cores drawn, show much copper in a lode of exceptional width. No. 17 hole shows copper in the core for 72 feet from a depth of 1,016 to 1,088 feet. Another hole, No. 22, 225 feet northeast along the strike shows good cores from 1,024 to 1,107 feet. These holes have been definitely correlated and the good cores of the two holes are confidently believed to be parts of the same amygdaloid—the Mayflower lode. A series of four beds near the lode has been found to occur regularly and to afford a convenient means of identification of the horizons. Some indications of faulting have been found.

In the annual report for 1912, President Paine says:

"During the past year diamond drilling has been carried on continuously and much valuable information obtained. The first part of the year it was found very difficult to tie together the data from different drill holes, but as the work progressed and our knowledge increased, we have been able to a large extent to correlate the more important formations.

"There is considerable drilling still to be done before the question of exploration by means of a shaft can be considered intelligently. The so-called Mayflower lode has up to date been cut in several places where the rock in the drill core was undoubtedly of commercial value and in several other places where it probably was not commercial, but the drilling results as a whole so far can be considered as decidedly encouraging."

Supt. Goodale says:

"The investigations in holes Nos. 18 to 28 have covered a rectangular area of about 1,400 feet in length, measured along the strike of the formations, and about 650 feet in width, the total strike line distance

between No. 16 and No. 26 being approximately 1,540 feet. Within this area the developments have indicated three essential features: First, that the mineralized formation disclosed in holes 16 and 17 is not of an accidental nature, but that it is a regularly bedded formation, being one of a series of seven distinct strata lying above and below the so-called "Lower" conglomerate. Second, that this series of formations either has a strike and dip different from that of the St. Louis conglomerate, lying above, or that it has been subject to faulting movement.

"Whether we have one or the other of these conditions, or a combination of the two, has not yet been definitely established. Third, that the mineralized formation shown in holes Nos. 16 and 17, known as the Mayflower lode, and the copper-bearing amygdaloid of hole No. 11, heretofore called the "No. 11 Amygdaloid," are indentical.

"In the development of copper values, the showings made in the several holes drilled during the year indicate a varying width of lode and degree of mineralization. Holes Nos. 27 and 28 have but recently been started; in every one of the others the Mayflower lode has been identified and has in some cases shown an exceptional degree of mineralization, holes Nos. 20 and 22 indicating the best values."

MEADOW MINING COMPANY.

Idle.

MICHIGAN COPPER MINING COMPANY.

Deficit December 31, 1912, $101,351.

The company has not been operating the mine during the past year and the work now being done is of an exploratory nature. A shaft was recently started to open up the Ogima lode. This was encountered at a short distance from the surface. It is intended to do some exploration in the Butler lode from or near this shaft.

During 1911 and 1912 the mine has been worked by tributors. These men are taking out ore from old workings on the "Branch Vein." In 1911 they mined ore yielding 327,773 pounds copper. A small number of men are, in 1912, taking out pillars, etc., in the upper levels.

The production made by tributors in 1912 was 162,590 pounds copper from the Branch vein between B and C shafts.

MOHAWK MINING COMPANY.

Balance of assets December 31, 1912, $897,316.40.

The property has been much improved during the past few years by the opening up of the southern part. Good ore has been found

in many of the workings tributary to shafts No. 4, No. 5 and No. 6, which command the recently developed portion of the Kearsarge lode. The deeper workings at the north end of the mine are not in such good ore, but during 1911, the drifts north from No. 1 shaft were above the average. The openings at No. 2 shaft were in poorer ground.

During 1911 all five shafts were deepened and 14,428.5 feet of drifting was done. 902,859 tons were hoisted and 100,311 tons were discarded. There was stamped 802,548 tons of ore, yielding 12,091,056 pounds copper, an average of 15.07 pounds per ton. The net profit for the year was $269,506.08.

During 1912 mining has been carried on with still more satisfactory results as the higher price of copper has greatly increased the profit.

The production for the year was 11,995,598 pounds refined copper from 787,941 tons ore, an average of 15.22 pounds per ton. Owing to shortage of trammers during the summer months, the tonnage stamped was about 20,000 tons below normal capacity. Cost was 10.61 cents and average selling price 16.08 cents per pound. Net profit for the year was $656,438 and $350,000 was paid in dividends.

On March 1, 1913 Mr. Fred Smith, agent since the company was organized, resigned his position. Mr. Theo. Dengler formerly of Atlantic Mine is now in charge of the Mohawk and Wolverine properties.

NATICK COPPER COMPANY.

Idle.

NATIONAL MINING COMPANY.

The property has been idle for several years, but it is reported that exploratory work by diamond drilling may be undertaken in the near future.

NATIVE COPPER COMPANY.

Idle.

NEW ARCADIAN COPPER COMPANY.

Cash on hand April 30, 1913, $624.76.

The company in June, 1912, started a shaft from which to explore lodes cut by diamond drilling. The results thus far obtained are outlined in the following reports of President R. H. Shields and engineer Herman Fesing.

Mr. Shields says:

"The result of the exploratory work at the New Arcadian during

the past year is very satisfactory and fully justifies the belief, that, in the territory adjacent to the new shaft now sinking, there are three veins of probable commercial value.

"With the completion of Drill Hole No. 26, all exploration work by diamond drilling was suspended, which will reduce expenses considerably. All work is now being confined to the shaft which has already been sunk to a depth of over 500 feet. It is the present intention of the management to make extensive lateral openings at the 750-foot level, and to install a larger hoist for deeper sinking. No other additions to the present equipment is necessary.

"In regard to the financial condition of the company, it was thought possible that favorable developments at the New Baltic mine would enable this company to realize on a portion of its holdings in the stock of that company and thus avoid an assessment. Recent developments at that mine are of the most encouraging nature. The directors, however, deemed it prudent, for the time being, to negotiate loans to a limited amount, which has been done."

Mr. Fesing says:

"Exploring by diamond drills, as outlined and referred to in previous reports, has been brought to completion; in all, 26 holes have been drilled, aggregating over 26,000 feet, and making almost three complete cross-sections of the property.

"Hole 23, located in the southwest quarter of the southwest quarter of section 30, last report, was completed at a depth of 1,503 feet. In addition to the copper bearing bed cut at 335 feet, noted in last year's report, several other unidentified amygdaloids carrying more or less copper were encountered.

"Hole 24, located 800 feet southeast of Hole 22, was drilled to a depth of 1,388 feet. This hole passed through the vein cut by Hole No. 22, and, while the copper contents were not so rich, the vein itself appeared strong and healthy and of good width.

"Hole No. 25, located near the center of the northeast quarter of section 30, and designed to cut further to the northeast, the same beds encountered in Hole 23, had to be abandoned at a depth of 110 feet, without penetrating the overburden.

"Hole 26, located about 600 feet northeast of Hole 25, was completed at a depth of 643 feet. Some little copper in unidentified amygdaloids was encountered.

"In view of the excellent results obtained in drilling Hole 22, a shaft was started last spring about 200 feet west of the east quarter post of section 17.

"In regard to the location of this shaft, which was of prime importance, consideration was given the position of the rich amygdaloid

cut by drill hole No. 22, lying a short distance to the west; also the position of a strong copper bearing amygdaloid vein cut in Hole No. 4 on the adjacent property of the New Baltic, and which crosses the New Arcadian property, a short distance to the east. Consideration was also given to the very promising looking amygdaloid vein cut at a shallow depth in Hole No. 7, and on which some test pitting was done last year with good results. This vein lies almost midway between the other two mentioned. Accordingly, we were convinced that the best location for the shaft would be on the middle vein, as all three veins can be economically developed and mined from this shaft.

"Ground was broken in June, 1912, for a three compartment shaft, and was sunk and timbered full size to a depth of 30 feet. From this point the shaft was reduced to a single department and ladder way.

"While ground was broken for this shaft in June, it was not until August that compressed air could be supplied and on April the shaft had attained a depth of 500 feet.

"When we consider that the vein upon which this shaft is being sunk was opened up on surface by test pits 1,400 feet apart, with a good showing of copper at each place, and that it has shown continual improvement as depth has been attained, both in width and copper contents, it is not unreasonable to expect that future developments on this vein will show gratifying results.

"In all former work at the old Arcadian, exploration was carried to a comparatively shallow depth, not much over 500 feet on an average, and results were not profitable. Different results might have been obtained at greater depth.

"I would strongly recommend that this shaft be sunk to a reasonable depth, which I would place at not less than 2,000 feet.

"Lateral openings may be made at different depths during the progress of the shaft, to open up and explore all three veins.

"Briefly summarizing, I would say that the present outlook at the New Arcadian is such as to warrant great hope for the future. The shaft is located in what has been proven to be a highly mineralized territory, comprising a large area; railroad facilities are ideal, and there is an ample supply of water. Anyone who will make himself familiar with conditions at the New Arcadian cannot but be favorably impressed, and I feel confident that the developments from the new shaft will be highly gratifying to the stockholders."

NAUMKEAG COPPER COMPANY.

42 Broadway, New York.

This company was incorporated March 21st, 1912, under the laws of Michigan. Its holdings consist of 1,260 acres of mineral land south-

west of the village of Houghton, Michigan, comprising the old Dakotah Mining Co., the South Side Mining Co., 160 acres of the St. Mary's Canal Mineral Land Co., the Naumkeag Mining Co., 160 acres in Section 3 of the Sheldon-Douglas lands, and 140 acres in Section 4 of the Pacific Copper Co.'s lands.

The company has an authorized capital of 200,000 shares of the par value of $25. 102,000 shares have been issued, $10 paid; 76,700 being issued for the property and 25,300 for the purpose of putting cash in the treasury.

The officers of the company are:

J. Parke Channing, President.
Sam A. Lewisohn, Vice-president.
E. H. Westlake, Secretary and Treasurer.

These officers and J. H. Susmann, Adolph Lewisohn, Theo. L. Hermann, Frank L. Van Orden, Irving J. Sturgis and Chas. J. Paine, Jr., directors.

The company reports that from the commencement of work on July 1st to the end of the year, the drilling done totaled 6,508 ft. up to the end of the year, four holes were drilled to specified depths, and two others partially drilled, these having been since completed and two others started.

Hole A reached a depth of 1,401 feet, and at 515 feet found good copper on the Hancock No. 3 lode.

Hole B, down 1,378 feet, found practically no copper on the Atlantic lode at 250 feet, and only traces to a little fine down to the bottom of hole. Quincy Pewabic lode showed a little fine copper at 1,295 feet.

Hole C at 970 feet cut 3 inches copper, while D and E revealed mostly traces.

Hole F completed February 15, 1913, showed copper at 483 to 504 feet.

A crosscut in the old adit in South-Side tract near Portage lake was opened for 200 feet, of which 100 showed traces of copper.

Drilling will be continued in southeast portion of property and following the visit of President Channing in the near future, decision will be made as to whether drill work results have been sufficiently encouraging to warrant recommending sinking a shaft.

Cash on hand December 31, 1912, was $232,153, and miscellaneous assets amounted to $20,847.

NEW BALTIC COPPER COMPANY.

Balance January 1, 1913, $23,576.73.

The exploratory shaft begun in 1910, has been deepened and lodes

explored by crosscuts and drifts. During 1912 the work was confined to the 500 ft. level. The beds east of the shaft having been found to dip towards the east and off of the property, the exploration is now chiefly west of the shaft. A crosscut has now reached a distance of 1,575 west, having penetrated, according to General Manager Shields, more or less disturbed ground for 1,500 ft. and then entered a copper bearing bed with well defined walls. The crosscut will be continued and this copper bearing bed will be opened by drifts.

Dr. A. C. Lane, former State Geologist, examined the geological conditions at the property for the company and reported as follows:

"The whole formation is much fissured and shattered, and shows a large amount of secondary minerals. No. 8 conglomerate, which passes about 665 feet southeast of the Arcadian lode at that mine, and 3,015 feet southeast of the Wolverine sandstone, seems to continue on this course with only slight deviation as far as Hole Number 4 of your property, but must shortly shift, so, as on the Oneco and Torch Lake properties, to be a mile farther southeast from the Wolverine sandstone, Kearsarge lode, etc. This shift is largely accomplished on your property by faulting and abnormal dips. In and near your shaft the strike is, as recognized by your engineer, about N 10° W, and the dip about 45° to the east. I do not suppose that this holds for any great distance.

"The character of the highly marked amygdaloid and ophite beds is, in my judgment, like those under the St. Louis conglomerate and near the horizon of the Baltic lode,—such beds as are found in the shaft exploring for the Baltic lode in Section 12, Township 54 north, Range 34 west (Fig. 45 of my report for 1909).

"Masses of copper are occasionally found of a character similar to those found in that shaft, and they occasionally show slickensiding, showing that the copper was formed before some of the faulting. This is of importance, for the formation is so much shattered and the water of the mine so fresh, that I am led to believe that the exploration is not deep enough to give a fair test as to the copper-bearing capacity of any lode, for it may have—there are signs that it has—been either leached or carried down. For such a fair test the shaft should be sunk until the water coming from the rock, uncontaminated with that running down the shaft, has a specific gravity much more than 1. (See the tests and results of Chapter 7 of my report for 1909). That in the Isle Royale Mine, for instance, at the 10th level of No. 6 shaft, in the south end of the mine, has already a specific gravity of 1.050.

"It might be well also to trench a test pit near No. 3 drill hole, or put another drill hole vertically down from the same stand, probably not over 300 ft. deep.

"Copper is noted at 26, 70 and 97 feet in this hole, and below are three conglomerates. Such a hole would test again the copper shown, and, in connection with the outcrops near, enable your engineer, H. W. Fesing, to see if the easterly dip extends back this far, which will help in guiding exploration from the bottom of a deeper shaft."

NEW YORK CONSOLIDATED MINING CO.

Idle.

NONESUCH MINE.

Has been idle for some time, but the owners are preparing to reopen the mine in 1913. Some years ago the Calumet & Hecla Mining Company operated the property under option and mined some good ore but did not take up the option. Tests showed that the ore could be treated economically though considerable of the copper is so fine that it is not easily saved. There is not at present, however, a large quantity of the ore in sight.

NORTH LAKE MINING COMPANY.

Deficit December 31, 1912, $13,835.30.

Owing to the failure of President Dow, the company suffered severe financial loss in 1912. A new board of directors has been chosen and the exploratory work is being carried on with borrowed money. An assessment will probably be called in the near future.

The new officers are:

President, R. M. Edwards.
Secretary, Albert L. Wyman.
Treasurer, Henry Tolman.

These officers and John C. Watson, directors.

The work done in 1911 was by diamond drilling. The No. 12 hole was completed to a depth of 1,340 feet and No. 13 to 1,604 feet. No. 14 hole was abandoned at 512 feet and No. 15 at 514 feet, neither having penetrated the overburden.

The No. 13 hole showed considerable copper and furnished much information regarding structural conditions. Manager R. M. Edwards states in his report.

"No. 13 hole was completed to a depth of 1,604 feet. This hole is located 1,250 feet southeast of hole No. 3 and cuts the same horizon as that cut by No. 3 from the depth of 1,035 to 1,950 ft. The belts intersected by the two holes correlate perfectly; the dip indicated being about 45° to the northwest. No. 13 was drilled vertically and

went through overburden for 298 feet. From 392 to 439, it passed through a fine looking amygdaloid, 47 feet thick, showing a little copper with copper in the seams in the trap both above and below it. This bed is the same one that was penetrated by No. 3 hole at depth of 1,137 to 1,170 showing good copper values for ten feet. It was also cut by hole No. 7, 1,417 to 1,440, showing copper for ten feet. Below this amygdaloid hole No. 13 passed through the several beds of sandstone cut by holes Nos. 2 and 7 and at 1,244 encountered an amygdaloid eleven feet thick, which carried commercial copper values for its entire thickness, one piece of core three inches long, being solid copper. This bed correlates perfectly with that found in No. 3 drill hole where the drill was blocked for days by a piece of mass copper, when that hole was being drilled. No. 7 was not quite deep enough to reach this point."

During 1912, shaft sinking has been started. Early in the year, the forest was cut off and a railroad spur from the Copper Range main line constructed. Sinking was started in a rock outcrop near No. 3 drill hole. The shaft is vertical and the intention is to sink it 1,000 feet and, at that depth, to explore all the beds showing copper. The shaft has been sunk about 40 feet and in November, 1912, a new hoist and compressor for the deeper work were being installed.

By the failure of Pres. Dow on September 23, 1912, the company sustained a loss of $160,188 which should have been in the treasury at that time. To meet expenses from August 1 to December 31, 1912, $19,000 was borrowed, and this amount is being increased at the rate of approximately $5,000 per month.

On December 31, the shaft had reached a depth of 63 feet and Pres. Edwards reports that, at a depth of 91 feet, it has intersected the hanging wall of No. 8 conglomerate which establishes its position geologically. In this connection he says:

"The South Lake shaft, located 1½ miles southwest of the North Lake shaft, has recently passed through three amygdaloid lodes well charged with copper which lie about 400 feet above No. 8 conglomerate. This fact has an important bearing on North Lake because this geological horizon can be readily explored on the North Lake property by a crosscut northwest from the shaft. As soon as the shaft has attained sufficient depth, it is proposed to drive such a crosscut to the northwest and also one to the southeast to explore the lodes which diamond drilling has proved lie in this direction under No. 8 conglomerate."

OJIBWAY MINING COMPANY.

The company, late in 1911, mined ore for a mill test and is now continuing exploration at lower levels in an endeavor to develop suffi-

cient good ground to permit continuous production. The ore treated in the test shipments proved disappointing yielding only 7.28 pounds copper per ton. At No. 1 shaft, more promising openings have been recently made at the 16th and 17th levels. The shaft is, in December, 1912, 2,051 feet deep on the incline of 33°. At the 19th level a raise is being made to intersect the lode, which appears to be flattening considerably with depth. At No. 2 shaft a diamond drill is being operated to explore south and west from the mine workings.

To continue the work, an assessment of $1 has been called and is payable December 10, 1912. The present expenses are said to be about $6,500 per month, so this assessment of $84,000 provides for a year's operations.

The ground so far opened up, has not proven satisfactory; but there are structural features which lead Dr. Hubbard to hope that more valuable deposits will be opened up at greater depth.

The President states his reasons for this belief as follows:

"A careful examination of the different openings off No. 1 shaft discloses the probable existence of mineralized basins in the ancient "Kearsarge" formation separated by barren trap ridges. These basins trend from south to north and, thus far, near the surface are not wide. The central parts of the basins appear to be the richest, and they all probably contain commercial rock, the lateral delimitation of which must, of course, depend upon the varying price of copper. If the basins above noted be the work of ancient corrosion, it is probable that the ancient stream flow was towards the northwest, and as the shafts gain in depth we should expect to find these basins or ancient valleys widened out and the contemporaneous beds in them merged into one continuous bed. If this hypotheses be true, the occurrence of copper of commercial quality should be more uniform and the deposits should be mined with greater economy. The history of other properties in this Kearsarge group leads us to hope for better conditions as we go deeper, and we believe it to be good policy to sink No. 1 shaft as far as possible with our present plant, and by aid of the diamond drill, or otherwise, to explore the new ground thus made accessible."

Concerning the mill test made in November, December and January, President Hubbard reports:

"On November first, shipments began to the Tamarack mill from all but three of the stopes and other openings, these three showing no copper. In all 7,448 tons of rock were stamped, the returns from which at the mill were estimated at 6.58 pounds of refined copper per ton of rock. After November 21st, all mass copper, as far as practicable, was retained at the mine, and by estimate amounted to 0.7 pounds per ton stamped, bringing the total product up to about

7.28 pounds per ton of rock, with tailing losses of about three pounds.

"The mill product as reported, varied from period to period. That for the first period ending November 21st, showed a much less amount of mass and barrel work than had been expected by the mine officials, and a total of 5.89 pounds per ton of rock. Between November 21st and December 1st, the mill product was estimated to be at about the rate of 13 pounds per ton, which, with the mass accumulated during the same period at the mine, brought the total up to about 15 pounds per ton. The rock, from which this total came, was not considered by the mine management to be any better than that supplied during the previous period."

OLD COLONY COPPER COMPANY.

During the past two years, the company has obtained very promising drill cores from the Mayflower lode. The drilling is being continued in order to obtain additional information regarding the extent and structural relations of the ore body.

Supt. Goodale describing recent explorations says:

"We have located the horizon of the Mayflower lode in each hole driven in the Old Colony property, and all of the holes through this information have disclosed copper, the general average of all the values indicating a formation with an unusual degree of mineralization.

"Holes Nos. 19 and 20 were designed to investigate the lode about 1,000 feet east of hole No. 14. In No. 19, we have just cut the formation, having first passed through the overlying trap, below which was the mineralized amygdaloid bed, followed by the footwall trap, the middle conglomerate and the lower ophite. The data secured from this hole is more satisfactory than that from No. 18, for, while No. 18 definitely located the Mayflower lode, which showed rather phenomenal richness, only a small portion of the core was secured, the drill having evidently cut a fault plane showing considerable disturbance at that point. Hole No. 20 is now sinking about 600 feet northeast on the assumed strike line through No. 19, and No. 21 has been located about 300 feet west of No. 15.

"After the completion of hole No. 20, further attention will be given to the southerly extension of the lode."

ONECO COPPER COMPANY.

Balance of assets January 1, 1913, $60,196.

Exploration has been continued during 1912 by crosscuts and drifts at the 11th and 12th levels.

President John D. Cuddihy in his report to the stockholders says in part:

"During the past year the shaft was sunk 236 feet, on a dip of 37 degrees, to a point 1,250 feet below the collar and plats cut at the tenth, eleventh and twelfth levels.

"Shaft was bottomed at a depth of 1,250 feet and lateral openings extended on the vein at the 11th and 12th levels. The 11th level was driven south 355 feet and the 12th level 361 feet north and 340 feet south of shaft, respectively, mostly in fair character vein, but it does not carry in commercial quantity

"After the shaft had attained a depth of 1,250 feet extensions were made north and south at the bottom level (12th level) and at the 11th south, at which approximate depth good quality vein was intersected by diamond drilling.

"Lateral openings on the lode are the most practical method to adopt, and although no main copper bearing course has been met the character of the vein warrants the assumption that such copper courses of commercial value may exist both north and south of the shaft and these lateral openings under existing conditions should be extended for some considerable distance before resuming the sinking of shaft.

"The surface equipment is not adequate to carry on more extensive development work to advantage and continue sinking the shaft at the same time, but will answer all purposes for development work and mining on a small scale to a depth of some 1,500 feet."

ONONDAGA COPPER COMPANY.

This company was organized in 1912 under laws of the State of Michigan, with capital stock of 150,000 shares of $25 each. To purchase property and to finance the company's operations, 105,000 shares have been issued. $4 per share is paid in. 45,000 shares remain in the treasury.

The officers of the company are:

R. C. Pryor, President and Treasurer.
J. H. Rice, Vice-president.
Wm. Duffney, Secretary.

The property is in Ontonagon County, north of Bergland and south of the White Pine mine. About 11,000 acres in sections and fractional sections of townships 49-41, 49-42, 50-42 and 50-43 have been purchased and are being explored. A geological map was made during the summer and a contract let for diamond drilling. Two drills are now in operation. Ward B. Smith is superintendent.

OSCEOLA CONSOLIDATED MINING COMPANY.

Balance of assets December 31, 1912, $1,888,458.05.

The company worked both Kearsarge and Osceola amygdaloid lodes during 1912 and is equipping the North Kearsarge for larger production. One shaft was closed for a few weeks, owing to water flooding some of the workings, and recently hoisting at No. 1 shaft has been discontinued, while a new rock house is being constructed. The loss in output at North Kearsarge has been offset by resuming operations at No. 5 and No. 6 Osceola shafts. The mill has been remodeled and extraction is now higher than formerly. The Leyner-Ingersoll one-man drills have been adopted as standard. By use of these machines the company is able to pay higher wages while reducing cost in drifting and stoping.

In 1911 there was broken 1,276,790 tons of ore of which 30,194 tons were discarded. There was stamped 1,246,596 tons, yielding 18,388,193 pounds copper, an average of 14.8 pounds per ton at a cost of 9.28 cents per pound. A new low record was set in cost per ton mined, the average for 1911 being $1.14 per ton for mining, transportation, stamping and taxes. In 1911 there was paid in dividends $721,125, bringing the total up to $9,679,775. The profits were larger during 1912 and dividends amounting to $1,201,875 have been paid this year. Owing to higher wages and expenditure for construction, the cost per pound was higher; but the net profit was larger than in 1911 because of the better price received for the product.

In 1912 there was stamped 1,246,557 tons of ore yielding 18,413,387 pounds copper, an average of 14.8 pounds at a cost of 10.36 cents per pound. 17,175,066 pounds was sold at 16.63 cents per pound, the balance at about 15 cents.

At the Osceola branch, mining operations were resumed in No. 6 shaft on June 1st and in No. 5 shaft on October 1st. There were produced 115,551 tons ore yielding 1,479,642 pounds copper, an average of 12.8 pounds per ton, at a cost (excluding mill construction), of 14.55 cents.

At the North Kearsarge branch, there was produced 672,231 tons of ore, yielding 8,611,720 pounds copper, an average of 12.81 pounds, at a cost of 11.44 cents.

At the South Kearsarge branch there was produced 458,651 tons ore yielding 8,322,025 pounds of copper, an average of 18.15 pounds per ton, at a cost of 6.79 cents per pound.

President R. L. Agassiz states:

"Fully two-thirds of the (South Kearsarge) tonnage was mined from the footwall. This rock consisted in part of vein matter which extended back into the footwall and in part, of foot trap which was

found to contain copper. This rock can be mined cheaply and it is hoped that a large part of the old stopes can be worked over in this way."

Mr. Agassiz reports that the remodeling of No. 3 and No. 4 heads at the stamp mills was completed in July and work started on No. 5 head in September.

PACIFIC COPPER COMPANY.

Idle.

PHOENIX CONSOLIDATED COPPER COMPANY.

Was merged with Keweenaw Copper Co. this year. The property will be explored by diamond drilling.

QUINCY MINING COMPANY.

Balance of assets December 31, 1912, $1,233,278.15.

The company continues large and profitable production, while doing extensive development work and improving equipment at mine, mill and smelter. In 1911 there was stamped 1,382,524 tons of ore which with mass sent direct to the smelter, yielded 22,252,943 pounds copper. Silver in the ore netted a profit of $23,005.28. The business profits for the year totaled $507,596.71. There was paid in dividends, $440,000 and to the St. Mary's Canal Mineral Land Co. for property $158,005.10.

During 1912 scarcity of labor has kept down production somewhat, but in spite of higher wages the profits, owing to good prices for copper, have been larger. $550,000 was paid in dividends.

In September 1912, the No. 8 and No. 9 shaft workings were connected. A long drift was carried north from No. 8 at the 20th level and No. 9 has now been completed to this depth. This northern shaft will now be equipped for heavier work, a new hoist and rock house being necessary before an important output can be made.

The management has found light weight rock drilling machines to be preferable to the larger machines and is gradually equipping the mine with the former. To provide air at higher pressure for the light drills, a compressor has this year been installed to take the air at 60 pounds pressure and raise it to 100 pounds pressure.

No. 8 shaft has been electrified for power tramming and is equipped with new automatic side dump tramcars. At No. 6 shaft the rock house has been remodeled and the ore is now more economically handled there. At the stamp-mill, improved extraction has been obtained by installation of newly designed classifiers. At the smelter

a new reverberatory furnace of 50,000 pounds capacity was completed in 1911 and has been in operation with good results.

In 1912 there was produced 1,309,253 tons of ore yielding 20,634,800 pounds of refined copper, or 15.7 pounds per ton. The mining profit was $1,089,673.68 and net business profit for the year was $960,778.84. The profit from sales of silver was $30,227.50.

The report of the general manager, Charles L. Lawton says in part:

"The operations of the Quincy mine, railroad stamp mills, and smelter for the year 1912, have included more development and construction than for several preceding years. This feature of the work, however, has been met to a considerable degree by the increased price of copper, which has also permitted the wider distribution of efficiency installation. Notwithstanding the shortage of labor and the more perceptible decrease in the output of No. 7 shaft, the tonnage of rock sent to the stamp mills was 1,309,253 tons. This means a consequent lessening of the total production of copper for the year, which, together with the increased cost of labor entails a higher cost.

"No material change has been noted in the copper contents of the rock in the new lower, or bottom, openings of the mine—this, of course, as compared with recent years—though the good showing of copper in the new openings of the bottom of the mine north of No. 8 shaft, is worthy of mention.

"The openings for the year have been greater by 2,625 feet than during the previous year.

"At No. 7 shaft the available stoping ground is being steadily mined out. The loss in tonnage from this shaft amounted to a million pounds of copper during the year.

"The 2,484 feet of drifting in this shaft was almost exclusively on one of the east branches, averaging about seven feet wide. It is rich stamp rock and carries much small and heavy mass copper. The shaft produced 376 tons of mass copper. There is no active work on the west branches in this shaft.

"The west branches only, of No. 2 shaft are being mined on the upper levels, where they are narrow and very irregular in width and copper contents. From the 11th to the 34th levels, they produce a low grade of stamp rock, but considerable mass copper. Below the 34th level, as the depth is gained, these branches gradually become wider, to an average of from five and one-half to six feet; and, while they continue to be irregular and bunchy, the stretches of poor ground are of less extent, some stopes being a very good grade of stamp rock. The heavy mass copper of several tons weight comes chiefly from these branches, as is also true of nearly all of the small, or barrel copper. The stopes on the lower level of the west branches are wider and pro-

duce a more uniform and better grade of stamp rock and contain more mass copper than the stopes on the upper levels. Some of the stopes are rich in copper, such as the 51st level north, the 53rd level south, the 57th level north, the 60th level north; and on the 66th level north, there are two parallel stopes that are heavy in copper. The shaft produced 996 tons of mass copper during the year. The east branches from the 64th to the 71st levels are wider and more uniform in width and copper contents than the west branches. They average about seven feet in width, and produce a fair to good grade of stamp rock, though not so much mass copper as the west branches.

"The development work ahead of stoping in this shaft is upwards of 12,000 lineal feet. The shaft was sunk 335 feet during the year, and will continue sinking. It is now down 503 feet below any stoping.

"The output of copper rock from No. 6 shaft fell below that of the previous year, and was hoisted from an average incline depth of four thousand two hundred and sixty feet. There is no special change in the copper contents of the rock developed in the bottom of the shaft.

"The lineal feet of development for the year was 10,460, about one-half of which was in the bottom. The development work ahead of the stoping in the shaft is now upwards of sixteen thousand lineal feet.

"In this shaft the west branches exclusively are being mined on the upper levels—namely, the 25th, the 27th, and the 29th—where they are a little wider than in No. 2 shaft; yet they have the same general characteristics of irregularity of width and copper contents and produce a low grade of stamp rock. Below the 29th level, they become narrower. From the 41st level to the 49th, the grade of stamp rock produced is fairly good, and there is more mass copper. Below the 49th level to the 64th level the west branches widen out to a maximum width upwards of ten feet, with an average of about seven feet. They produce a good grade of stamp rock; some stopes are very rich in barrel and heavy mass copper.

"With depth, the mineralization in the west branches is extending a greater distance to the north towards No. 8 shaft, until at the 46th level it appears as though they may merge into the south drift of that shaft. There are a number of stopes rich in copper—namely, the 43rd level south, the 46th, the 49th, the 41st, and the 57th levels north; while the levels from the 57th to the 61st south also have stopes rich in copper. These west branches yielded practically all of the small and heavy mass produced by the shaft, which was seven hundred and sixty-three tons.

"The east branches of this shaft are being worked from the 59th

level down to the bottom, or 68th level. As at No. 2 shaft, they are more uniform in width and copper contents than the west branches, and average upwards of seven feet, with a maximum of ten feet. They produce a fairly good grade of stamp rock. The old main extreme east branch, which contained little or no copper in the upper levels throughout the mine is carrying good stamp rock on the 63rd level down to the bottom of the shaft. It contains more or less small mass copper. The shaft has been sinking in this foot-wall branch from the 51st level. Openings are now being made on this branch, which show good stamp rock and may develop a new source for copper. The prospects for copper in the bottom of this shaft now are better than at any time during the past ten years or more.

"The shaft was sunk 121 feet during the year; and, excepting one stope and one raise for ventilation on the 65th level, is now down six hundred and eight feet below any stoping.

"During the year, there was another heavy caving of the surface on the outcrop of the lode, north of No. 6 or Pewabic shaft, owing to mining operations in former years having been carried too close to the surface. This was remedied, as were all the former ones, by a strong, heavy reinforced concrete wall.

"The production of copper rock from No. 8 shaft was slightly in excess of that of the preceding year, and was hoisted from an average incline depth of three thousand eight hundred and seventy feet. The development continues to open ground of about the same grade as formerly. The north drifts at the 46th and the 49th levels, of 2,000 feet and 2,150 feet, respectively, appear to have entered the low grade territory that lies to the north. The lineal feet of development work driven during the year was 9,256; there is upwards of 17,000 lineal feet of development work in the shaft ahead of stoping.

"The operations of this shaft were mostly on the east branches. There is some extra rich ground on the 17th level south, but it is small in extent. The active levels are from the 43rd level down. From the 43rd level to the 49th, the stamp rock produced is mostly low grade, while below the 49th level to the present bottom, or 56th level, a fairly uniform grade of stamp rock is produced, together with considerable mass copper. The east branches are now widest in this shaft, the average being perhaps eight feet, and the maximum upwards of twenty feet. There are stopes on the 50th, 51st, 53rd, and 55th levels north of the shaft, which are rich in copper. The west branches contain a rather low grade copper to the south of the shaft, where worked. To the north in the upper levels, they have not been found profitable to work; while, on the 51st level eight hundred feet north, a new three hundred-foot drift on the west branch shows good stamp rock. The shaft produced 810 tons of mass copper.

"The shaft was sunk two hundred and twenty-six feet during the year; and, excepting one stope on the 54th level for ventilation, is down three hundred and forty-four feet below any stoping, and sinking will be continued.

"At No. 9 shaft, the surface has been cleared and graded, preparatory to the erection of an engine-boiler-house, and a railroad spur built. The old Franklin carpenter shop was moved to No. 9, and equipped for treating the shaft timbers with preservatives.

"This shaft was holed into the raise from the twentieth level No. 8 shaft during the month of September, with such exactness that it reflects great credit upon the chief of the engineering staff The shaft was sunk 845 feet during the year; it is now down below the twentieth level, or 2,635 feet from the surface and will be sunk further this year. The shaft is now being reinforced with timbers, which are previously treated with preservative, and should be fully timbered to the fourteenth, or 1,920 foot level, by spring.

"Drifts are being driven both north and south on this level; and, when the shaft timbering is completed to this point, the hoisting of copper rock will commence.

"The total amount of development in this shaft is now about 3,900 lineal feet, of which 1,265 feet is in the lode. The third level is 960 feet long. At a distance of 450 feet from the shaft, it cut fair stamp rock, and continued therein for a distance of about 200 feet. More or less copper was cut in the shaft during the sinking, and fair stamp rock was encountered in the lode at a depth of 1,500 feet. At this point, there was only a portion of the lode showing, varying in thickness from two to six; it continued in the shaft until the lode passed out at 1,940 feet, where a station will be cut and drifting carried forward to the north. Throughout the mine there is upward of 50,000 lineal feet of work ahead of present stoping."

"The work at the stamp mills has been about the same as in former years. The investigation to promote efficiency and greater saving in copper, mentioned in former reports, has practically reached a satisfactory conclusion. One unit of a new system consisting of hydraulic classifiers, jigs and Symons rolls, will soon be installed on a normal working basis, to reduce all the oversize from the stamp head, and consequently to deliver a classified and a finer crushed sands to all the various machines in the mills, and thus to demonstrate the progress that has been made.

SMELTER REBUILT.

"At the smelter, repairs and renewals have been somewhat numerous during the year. Number 2 furnace was entirely rebuilt. The coal

dock has received extensive repairs, and similar repairs and renewals will be continued during the coming year."

ST. LOUIS COPPER COMPANY.

Balance of Assets December 31, 1912, $55,329.77.

Development work was begun in July, 1911, on the St. Louis lode, copper bearing amygdaloid discovered by diamond drilling. In January, 1912, the shaft was 165 feet deep and 128.5 feet of drifting and 76.0 feet of crosscutting had been done. Some, but no great quantity of copper was exposed by these openings.

The shaft has been equipped with a small hoist, a 12-drill compressor, two 90 h. p. boilers and a small rock house. During 1912 the exploration has been carried on rather slowly.

The results obtained up to December 31, 1911 are thus described by President Shaw:

"A cross-section of the formation was made by a line of diamond drill-holes running from the northwestern extremity of your property to the eastern sandstone at about right angles to the strike of the formation. All drilling was done at approximately right angles to the dip of the lode. Various lodes were cut, but none of them disclosed rock which gave evidence of carrying copper in commercial quantities until an amygdaloid lode, called the St. Louis amygdaloid, was located with an outcrop 7,160 feet east of the Kearsarge amygdaloid. On this line of drilling the lode was cut in three places by Nos. 8, 10 and 7 drill holes, in order to more accurately determine the dip of the lode, No. 7 drill hole striking the hanging side of the lode at a depth of 755 feet, showing the vein to be 29 feet wide with some copper values in about five feet on the foot-wall side of the vein. No. 8 drill hole reached the hanging side of the vein at a depth of 106 feet, and showed some fine copper scattered through a width of 10 feet. At an intermediate point between these two drill holes, No. 10 drill showed the vein 8 feet wide with no copper.

"About 750 feet north of No. 8 drill, along the assumed strike of this lode, No. 12 drill cut the formation, showing the vein to be 8 feet wide, carrying no copper values. About the same distance further north, No. 15 drill cut the vein, showing a width of 14 feet with no copper values. To the south of No. 8 drill hole, about 750 feet, No. 13 drill hole showed the lode to be 39 feet wide with a good showing of copper. 750 feet further south Nos. 16 and 17 drills showed the vein to be about 30 feet wide with good values of copper, and about 900 feet still further south No. 18 drill hole showed the lode to be 25 feet wide with no copper values.

"A short distance east of the outcrop of this lode the old St. Louis

conglomerate lode was located by drill holes, but no encouraging values were shown.

"A shaft was started last July in the St. Louis amygdaloid at a point opposite No. 13 drill hole. Sinking had not progressed very far when the shaft entered a belt of trap averaging about 6 feet in thickness and only a small portion of either of the sections of the lode was disclosed. Small bunches of copper were found from time to time but neither the shaft nor the drifts on the 1st level have shown rock of commercial value. In January, however, the drift to the south had a fair showing of copper."

In 1912 the Calumet & Hecla Mining Company acquired all the stock of the St. Louis and the property will hereafter be known as the St. Louis branch.

During 1912 there was completed 335 ft. of shaft sinking, 1,716 ft. of drifting and 65 ft. of crosscutting. The shaft is now 500 ft. deep.

President Shaw reports:

"Drifting on the 2nd, 3rd and 4th levels while showing some good copper rock, has not as a whole developed ground of commercial value. Diamond drilling to the north of this shaft has given no information as to the location of the so called Mayflower lode. It has, however, shown a comparatively large area throughout which copper was found in both the trap rock and various amygdaloid beds."

SAINT MARY'S CANAL MINERAL LAND COMPANY.

From land sales and from ownership of 50,000 shares of Champion Copper Co. the company has made large profits in recent years. As owner of 25,000 shares of Mayflower stock, the company is taking an active interest in the exploration of the Mayflower lode and, during 1912, had representatives placed on the directorate. As owner of 20,000 shares of Hancock, a large sum has been contributed to the development of the Hancock and Pewabic lodes. As the Hancock Mine is now nearing the producing stage, it is hoped that further assessments will not be called for and that the mine will become a source of profit. The company's 37,222 shares of Houghton Copper stock have become a large asset, owing to favorable developments at the mine. As there seems to be also a reasonable chance of the Winona Mine becoming a source of profit instead of assessments, the St. Mary's Company may be expected in the future to derive considerable revenue from several producing mines.

The company in 1911 received $250,000 dividends from the Champion Copper Co. and $150,000 on account of lands sold to the Quincy Mining Co., $480,000 was paid out in three dividends of $160,000 each and there was left on December 31, 1911, a cash balance of $81,263.15.

In 1912 $550,000 was received in dividends from the Champion Copper Co. During 1912, 160 acres of mineral land was sold to the Naumkeag Copper Co. for $21,825 and 6,340 shares stamped $10 paid in.

SECTION TWELVE EXPLORATION COMPANY.

Idle.

SENECA MINING COMPANY.

Balance of liabilities December 31, 1912, $142,318.90.

Exploration of the Kearsarge vein was discontinued in April, 1911, owing to unfavorable results and unsuitable location of the shaft which had been sunk for development purposes. The mine has since been idle. The directors state that they "believe that the only practical method in developing your property is in connection with Gratiot, which will obviate the great expense, not now justified by known conditions, of sinking vertical shafts to explore the lode on the southern portion of your property." No development work was done during 1912. Liabilities increased $10,207.95.

SENTER-DUPEE DEVELOPMENT COMPANY.

Idle.

SOUTH LAKE MINING COMPANY.

Surplus assets January 1, 1913, $29,885.77.

In July, 1911 the company started to sink a shaft to open up lodes cut by drilling, but much water was encountered and the site abandoned. The property then remained idle for several months, but the necessary funds having been arranged for and a superintendent, R. M. Edwards, appointed, work was resumed this summer. A vertical shaft was started at a point 1,500 feet south and 1,500 feet east of the N. W. corner of sec. 31 and 200 feet from the main line of the Copper Range Ry. The shaft starts in rock at the base of Evergreen Bluff.

Mr. Edwards states:

"The location of the shaft is such that the lower lodes of the Evergreen Bluff series should be encountered at shallow depth and the Butler and Knowlton lodes can be reached, if desired, by short crosscuts to the northwest. It is proposed to sink the shaft to a depth of 600 feet as a three compartment working shaft. From the 600 foot level, a crosscut will be run southeast to cut the new lodes, the first one of which should be approximately 1,000 feet from the shaft at this level, the exact distance depending on the dip and strike of the lodes. In

A. NORTH LAKE SHAFT, 1912.

B. STARTING EXCAVATION AT SOUTH LAKE MINE.

C. NO. 2 SHAFT IN LAKE LODE. SHOWS THREE COMPARTMENTS.

A. ORE BINS AND CRUSHERS, NO. 2 SHAFT, LAKE MINE.

B. DIAMOND DRILLING ON MAYFLOWER PROPERTY.

C. DIAMOND DRILLING ON OLD COLONY PROPERTY.

A. NO. 1 SHAFT OJIBWAY MINE.

B. A VIEW OF PORCUPINE MTS., ONTONAGON COUNTY, FROM SHORE OF LAKE SUPERIOR.

C. VIEW NORTH FROM NO. 2 SHAFT, ISLE ROYALE MINE.

A. ROCK HOUSE AT NO. 2 SHAFT, LAKE MINE, ONTONAGON CO.

B. NEW ROCK HOUSE AND TEN TON SKIP AT FRANKLIN JR. MINE.

C. NEW AND OLD ROCK HOUSES AT C-SHAFT, MASS MINE.

addition to opening the new lodes, the shaft and crosscut will thoroughly explore the ground cut by No. 1 drill hole, which showed as many as eight different beds carrying copper."

The shaft is now well started and a steel head frame similar to that at Indiana Mine is in place. A hoist for deeper sinking has been purchased and is now being erected. It is stated that three copper bearing amygdaloids have been cut at a depth of between 110 and 210 feet.

Mr. Edwards states:

"The first of these lodes was 18 ft. the second 10 ft. and the third 40 ft. thick. They dip to the north-west and are probably the same as those cut by No. 1 drill between 160 ft. and 254 ft. where they all showed copper."

SOUTH RANGE MINING COMPANY.

Idle.

SOUTH SIDE MINING COMPANY.

The property was, in 1912, merged with neighboring ones in organization of Naumkeag Copper Co.

SUPERIOR COPPER COMPANY.

Balance of assets December 31, 1912, $99,784.

The company has continued exploration and development work and is not yet making a very large production. Extensive openings have been made on two lodes—the Superior, which is probably a continuation of the Baltic lode, and the so-called West lode. The latter has proven to be remarkably rich in places and is a very important addition to the reserves. The discovery and exploration of this lode in 1911 is described by the management.

"Explorations by diamond drilling and crosscuts in the hanging wall of the Superior lode have developed what now appears to be a new copper-bearing amygdaloid lode, lying parallel with the Superior lode and separated from it by a bed of trap varying in thickness from one foot to 45 feet. This new lode differs in appearance and character from the Superior lode and contains secondary minerals that are absent in the latter. These explorations have been conducted at two points on the 12th level, 300 feet apart; at four points on the 13th level covering

a distance of about 800 feet; and at two points on the 14th level, about 200 feet apart. In all but one of these places the lode has been found to be well charged with copper and to vary in thickness from 14 to 30 feet."

During 1912 arrangements were made to treat the ore at the Allouez-Centennial plant at Point Mills. A railroad spur connecting the Isle Royale Railway with the Mineral Range has been constructed and it is expected that shipments over this line will begin in January, 1913. The ore thus far produced has been treated at the Atlantic mill. The company should save money and get a better recovery in the Allouez mill, which was designed for the ore. Larger shipments will be made in 1913. Recent production has been chiefly from the West lode.

During 1911 both shafts were deepened, No. 1 to 1,763 feet and No. 2 to 1,210 feet. At No. 1 there was done 5, 956 feet of drifting and 548 feet of crosscutting, and at No. 2, 881 feet of drifting and 135 feet of crosscutting. Similar work has been done in 1912 and No 1 shaft is now at the 20th level and No. 2 at the 14th level. The sinking at No. 2 level was discontinued for some time while connection was being made at the 13th level with No. 1 shaft.

There was stamped in 1911, 162,599 tons of ore yielding 3,236,233 pounds copper, an average of 19.90 pounds per ton, at a cost of 15.31 cents per pound. Low production and extensive development have kept the cost high in 1912 also, but large and profitable output can be made when the preliminary work has been satisfactorily done.

In 1912 there was stamped 172,322 tons ore yielding 3,921,974 pounds refined copper, or 22.76 pounds per ton, at a cost of 12.75 cents per pound. Net profit for the year was $99,784.

The management reports that shafts No. 1 and 2 have reached depths of 2,014 and 1,341 ft. respectively from the surface. Operations at the shafts are described as follows:

No. 1 Shaft.

"WEST LODE.—The lode discovered late last year proved to be independent of the Superior lode, and has been named the "West lode." Cross cutting on the levels above the 12th showed the lode to be badly split, with practically no copper. On the 12th, 13th, 14th, 15th, 16th, 17th, and 18th levels the openings have developed rock of good quality. No extensive development work has yet been done beyond a fault located 500 feet north of the shaft on the 13th level.

Good continuous copper rock has been opened on the 15th and 17th levels for a distance of about 1,000 feet each.

"SUPERIOR LODE—Stoping was practically discontinued early in the summer because of the proximity of the West lode, which lies parallel to and just above this lode. It will be necessary to mine the West lode before stoping can be carried on directly underneath on the Superior lode.

"Development was confined to the 13th and 15th levels. Nothing was discovered on the 13th, but the 15th passed through a chute of very good ground about 300 feet long and at the present time the breast of the drift is again in good rock 1,300 feet north of the shaft.

"The shaft passed into the trap between the Superior lode and the West lode at the 19th level.

No. 2 Shaft.

"The 13th level, driven through the St. Mary's land, has connected the two shafts, giving better ventilation and making safer conditions for the men. No commercial rock was developed either on the West or the Superior lodes, the formation being badly broken. The shaft is now being sunk to 17th level, where it will be connected with No. 1 shaft below St. Mary's property."

TAMARACK MINING COMPANY.

Balance of assets December 31, 1912, $1,120,861.

After some years of unprofitable operation, the company decided in November 1911, to discontinue all development work and confine attention to the ore already blocked out. President R. L. Agassiz, in March, 1912, stated regarding this policy:

"The results for November and December show a cost of about 12 cents per pound and it is hoped that, with the same copper contents, these results can be continued; but whether or not the margin of profit will warrant again making openings must be determined by future conditions."

During 1911 there was broken 478,674 tons of ore of which 86,336 tons was discarded. There was stamped 392,338 tons of ore which yielded 7,494,077 pounds copper, an average of 19.1 pounds per ton, at a cost of 15.56 cents per pound. During 1912 a somewhat larger output has been obtained at lower cost. This year therefore, the company has once more become a profitable producer.

As the stamping capacity is greatly in excess of the probable pro-

duction of the mine, it is planned to dispose of part of the plant. Arrangements have been made to sell two heads, 1,500 shares of the stock of the Mutual Water, Light and Power Co. and the small boiler house with three boilers, necessary for the operation of these heads, to the Lake Milling, Smelting and Refining Company, for the sum of $230,000. This sale will provide funds for building a recrushing plant for the retreatment of Tamarack conglomerate sands. It is claimed that this can be done at a substantial profit. Experiments at the Calumet & Hecla mill on similar sands give assurance of this.

To improve recovery of copper from the ore, the mill is now being remodeled. The concentration will be accomplished by use of Woodbury jigs and Wilfley tables and the sands reground in Hardinge conical pebble mills.

In 1912 there was stamped 421,385 tons of ore yielding 7,908,174 pounds of copper, or 18.8 pounds per ton, at a cost of 13.15 cents per pound. A profit of $269,612 was made.

At No. 2 shaft ore was taken from a portion of the conglomerate lode previously abandoned on account of crushing and some ore was taken from the Osceola amygdaloid. Fairly good openings were made at No. 3 and No. 5 shafts and it is stated that "the 40th level north at No. 5 shows better copper values than any of the higher levels on this side of the shaft."

TOLTEC MINE.

Idle.

TORCH LAKE MINING COMPANY.

Idle.

TREMONT AND DEVON MINING COMPANY.

Idle.

TRIMOUNTAIN MINING COMPANY.

Balance of assets December 31, 1912, $531,394.34.

The company has recently been very successful, owing to the development of good ore in the lower levels of the mine. The openings made in 1911 and 1912 give assurance of a large tonnage that can be mined profitably and the prospects are bright.

In 1911 there was hoisted 392,832 tons of which 44,947 tons were discarded. There was stamped 347,885 tons of ore, which yielded

6,120,417 pounds copper, an average of 17.59 pounds per ton at a cost of 11.55 cents per pound.

Speaking of the results obtained in 1911, General Manager F. W. Denton reports:

"Underground, the improvement noted in my last report continued steadily throughout the year. No. 2 shaft from the 21st level to the bottom has shown very good ground, and some unusually large masses have been taken out. At Nos. 3 and 4 the openings have also been very satisfactory, and we are assured a steady improvement in output and costs."

At the mill, changes have been made in concentrating apparatus and Hardinge conical pebble mills installed to regrind sands. To insure a supply of water, a new intake has been constructed by driving a tunnel out under the lake for a distance of 1,970 feet.

The company reports that the openings made during 1912 were satisfactory and added materially to the reserves. The lower openings all show good ground.

There was stamped in 1912, 366,663 tons of ore, yielding 6,980,713 pounds of copper or 19.04 pounds per ton. This cost 11.73 cents per pound and was sold for 16.16 cents. Net profit for the year was $308,472 and $300,000 was distributed in dividends.

UNION COPPER LAND AND MINING COMPANY.

The company finished the year 1912 with $3,853 cash and with total land holdings unchanged, viz.: 6,366.7 acres. Options were granted on several parts of the property but no sales made during the year.

VICTORIA COPPER MINING COMPANY.

Balance of assets December 31, 1912, $27,623.58.

The company made a good showing in 1911 and would probably have made substantial profit in 1912, if a large production had been handled. Crippled by shortage of men, the mine has not been able to take advantage of the good price for copper.

There was stoped in 1911, 5,437.41 cubic fathoms. 145,764 tons were hoisted and 18,870 tons discarded. There was stamped 126,894 tons of ore which yielded 1,303,331 pounds of copper. From the mining operations a profit of $2,200.32 was made, but there was expended for interest, construction, development of water power, legal expense and sinking No. 6 shaft, the sum of $39,850.75.

During 1912 the workings at the producing shaft have been extended chiefly to the east. The shaft has been deepened to below the 22d level. At the new or No. 6 shaft the 12th level drift is being carried west to connect with the main shaft.

The underground force has been recently reorganized and it is hoped that increased efficiency will be obtained. A present great drawback is lack of men. Several dwelling houses have been constructed during the summer with the object of attracting a more steady class of laborers.

During 1912 there was stoped 6,448.12 cubic fathoms. 152,666 tons was hoisted, 20,711 tons discarded and .131,955 tons stamped. There was produced 1,224,911 pounds of copper at a profit of $428.35. Expenditures for several purposes reduced he surplus $36,421.

WHITE PINE COPPER COMPANY.

Balance of liabilities December 31, 1912, $16,701.36.

Promising results have been obtained from recent development work and considerable good ore is now blocked out. It has been found that the lodes are frequently displaced by faults and extensive exploration will be necessary in order that the structure may be properly interpreted and a safe approximation of the size and contents of individual blocks of the lode obtained.

During 1911 at No. 1 shaft, the winze was sunk 266 feet and 1,096 feet of drifting and 250 feet of crosscutting was done. A second vertical shaft was started 1,650 feet west of No. 1. During 1912 sinking, drifting and crosscutting have been continued with good results. At a depth of 131 feet a drift is being carried east to connect with No. 1 shaft workings.

There has been, as yet, no attempt made to produce a large quantity of ore. A large stock pile—said to contain about 5,000 tons of good ore—has accumulated at No. 1 shaft, but this is from development work only. The operating shafts are both small ones, unsuited for production on a large scale and not likely to be used for other than exploratory work. A larger and more advantageously located shaft will likely be sunk before much stoping is done.

During 1912 at No. 1 shaft openings were: drifting, 354 ft.; winzes, 144 ft. and raises 612 ft. The No. 2 shaft was sunk to 135 ft. and openings were: drifting, 197 ft. and crosscutting, 228 ft.

President Shaw says in his report:

"At No. 1 temporary shaft, the 3rd level was extended 354 ft. mostly in good copper ground. The lode is not as badly faulted here as it is further east. The No. 1 winze has been straightened between the 1st

and 3rd levels and is being extended to the 4th level. No. 1 raise, 110 ft. west of No. 1 shaft, was carried 247 ft. above the 1st level in the Second Lode, and the First Lode was cut into at two points, but very little copper was found. No. 2 raise, about 700 ft. west of No. 1 shaft, was carried up 257 ft. in the First Lode and for 200 ft. above the 1st level is very rich. This raise will be carried to surface and used as an inclined shaft.

"No. 2 temporary shaft reached the ledge at a depth of 45 ft., cutting into the lode with good copper values on each side of a nearly vertical fault. The shaft passed through the lode and at the elevation of the first level a crosscut was driven south about 100 ft. to the lode which was found to be badly faulted."

WILMOT MINING COMPANY.

Idle.

WASHINGTON COPPER MINING COMPANY.

This company's property will be explored by the reorganized Keweenaw Copper Co.

WEST MINNESOTA MINING COMPANY.

Idle.

WHEALKATE MINING COMPANY.

Idle.

WINONA COPPER COMPANY.

Balance of assets December 31, 1912, $62,034.

After a period of development and construction work, the property is now in shape to make larger and more economical production. Profit from operations should be made in the near future, if the price of copper remains good and sufficient laborers can be secured.

The company's mill was completed early in 1911 and production begun in March. Owing to a considerable percentage of the copper in the ore being in a finely divided state, much experimentation has been necessary that a good recovery may be made. It has been found advisable to install regrinding apparatus—Hardinge conical pebble mills—and additional concentrating tables. At present one head

is working continuously, but the second head is only occasionally in operation as labor shortage at the mine prevents desired production being obtained.

In 1911 there was stamped 97,445 tons of ore yielding 1,275,675 pounds copper, an average of 13.09 pounds per ton. The recovery made during the first four months of operation of the mill was about 12 pounds per ton, but improvements made brought the average up.

The production at present is from No. 3 and No. 4 shafts, chiefly from the latter. Much work has been done underground in preparation for production. Shafts and drifts have been retimbered. In places dry walls have been used, but suitable building rock is not commonly broken and the present practice is to build drift sets lagged with cedar. Chutes are placed about 50 feet apart and mills are walled with rock or with hardwood. The ore is sorted in the stopes and about one-half is discarded and used for fill.

In 1912 there was stamped 181,148 tons ore yielding 2,307,237 pounds of refined copper, or 1,274 pounds per ton. Excess of expenditures over receipts was $84,781. A better showing would have been made if trammers could have been obtained. Pres. Hubbard reports that openings in some of the lower levels, especially in the 15th, off No. 4 shaft have shown a marked improvement in the copper content of the rock over that of the levels immediately above.

WOLVERINE COPPER MINING COMPANY.

Balance of assets June 30, 1912, $746,520.15.

The company continues to make large profits from the Kearsarge lode and is expected to do so for 10 or 12 years more. Some exploratory work has been done on other lodes but so far without notable success.

In the year ended June 30, 1912, there was hoisted 414,544 tons of which 13,236 tons were discarded. There was stamped 401,308 tons of ore, yielding 9,408,960 pounds copper, an average of 23.45 pounds per ton, at a cost of 7.586 cents per pound. The net profit for the year was $613,180.53 and $540,000 was distributed in dividends. Concerning development and exploration done during the fiscal year, Agent Fred Smith reports:

"Openings on the Kearsarge lode were in about the same grade of ground as in previous years, with the exception of the 35th and 36th levels between Nos. 3 and 4 shafts, where the vein was not so continuously mineralized as in the levels above.

"The work on the Osceola lode was disappointing, as nothing of

value has thus far been encountered. In detail, this work consisted of 516 feet of shaft sinking, 669 feet of drifting on the 2d, 3rd and 4th levels and 795 feet of diamond drilling on the 2nd and 3rd levels. The vein is wide and well defined, but is mineralized in spots too widely scattered to give it commercial value. The cost of this work was $15,950.28 and was charged to operating expense.

"The crosscut east at the 28th level was advanced 514 feet to a total distance of about 1,600 feet from the Kearsarge lode. Several promising lodes were passed through and a drift driven 82 feet north of the Old Colony Amygdaloid which lies a distance of 1,489 feet from the Kearsarge lode. Nothing of value was disclosed by this work, but more drifting will be done at this point and several other lodes which were disclosed during the progress of the crosscut should be examined before any definite conclusion as to commercial value can be reached. The general condition of the mine and the reserves of stoping ground created during the past year give promise of satisfactory returns for the year to come."

During the year Mr. Fred Smith resigned his position at the Wolverine and Mohawk mines and was succeeded by Mr. Theo. Dengler, formerly superintendent at Atlantic mine.

WYANDOT COPPER COMPANY.

Balance of assets March 31, 1913, $53,704.48.

Exploration during the past few years has shown that copper occurs in several amygdaloids on the company's property. No considerable body of good ore has yet been developed however.

An assessment of $1.00 per share was called in 1911 and exploration has been continued with fair results. The No. 8 lode, considered by the management to be the most promising of those discovered has been reached by a crosscut from No. 11 shaft. A winze is now being sunk to explore this lode at greater depth.

Agent F. L. Van Orden on April 1, 1912 stated in regard to No. 8 lode.

"Some drifting was done on this lode two years ago with encouraging results, but it was deemed best to conserve our funds with which to prosecute the work in the cross-cut, the chief aim of our exploration being to expose by means of a cross-cut the lodes lying on the Eastern side of the mineral range, and to be in a position to drift upon any lode that is sufficiently promising.

"Drifting was again taken up on Lode No. 8 on February 1, and, since that time, we have made a very creditable showing. We are at present drifting both northeast and southwest on this lode, either

side of the crosscut, and the showing in the breast of both drifts is sufficiently encouraging to warrant us doing considerably more drifting. This lode was encountered in our crosscut about November 1, 1909, at a point 1,100 feet southeast of the shaft or 2,300 feet southeast of the Winona lode horizon. The lode is 28 feet in width. The greatest mineralization occurs on the footwall side of the vein. However, sufficient drifting has not been done to date to give us a very thorough knowledge of the character of this lode. It is most encouraging and by far the best-looking lode we have encountered to date."

A winze, 7 ft. by 9 ft., has been sunk in the lode and drifts run north and south at the 815 ft. level. Mr. Van Orden states that the winze is in commercial copper ground most of the way, that the north drifts, have opened good ground and the south drift shows encouraging values. At the time of Mr. Van Orden's report the drifts were each 25 ft. in from the winze.

COPPER INDUSTRY OF MICHIGAN.

BY R. E HORE.

Statistical Tables.

1. Production of Copper in United States in Recent Years. (By States.)
2. Production of Copper in Michigan in Recent Years. (By mines.)
3. Summary of results obtained by 18 leading Michigan copper mines, in recent years.
4. Summary for year 1912.
5. Financial statements of Michigan copper mines, 1912.
6. Assessments called by Michigan copper mines, 1910, 11, 12.
7. Production of U. S and of Michigan for all years.
8. World's production of copper in 1909, 1910 and 1911.
9. Production according to class.
10. Monthly price of copper in New York.
11. Visible stocks of copper (each month).
12. Production and deliveries of copper in 1912.

PRODUCTION OF COPPER IN THE UNITED STATES.
(Smelter output in pounds.)

	1907.	1908.	1909.	1910.	1911.	1912.
Alaska	7,034,763	4,438,863	4,057,142	4,311,026	22,314,889	31,926 209
Arizona	256,778,437	289,523,267	291,110,298	297,250,538	303,202,532	359,322,096
California	33,696,602	39,643,833	53,568,708	45,760,200	35,835,651	31,516,471
Colorado	13,998,496	13,943,878	11,485,631	9,307,497	9,791,861	7,963,520
Georgia (a) Maryland and Alabama	(a)90,655	.....	.....	724	(a)23,555	53,043
Idaho	9,707,299	7,256,086	7,096,132	6,877,515	4,514,116	7,182,185
Michigan	219,131,503	222,289,584	227,005,923	221,462,984	218,185,236	231,112,228
Montana	224,263,789	252,503,651	314,858,291	283,078,423	271,814,491	308,770,826
Nevada	1,998,164	12,241,372	53,849,281	64,494,640	65,561,015	83,413,900
New Hampshire	.....	135,139	88,944	12,409	.....	.....
New Mexico	10,140,140	4,991,351	5,031,136	3,784,609	2,860,400	29,170,400
North Carolina	544,040	29,391	120,451	181,263	13,699	63,766
Oregon	518,694	271,191	245,403	22,022	125,943	311,860
Pennsylvania	.....	.....	994,089	740,626	661,621	248,378
Philippine Islands	.....	.....	.....	1,781	9,612	.....
South Dakota (b) includes Maryland, Alabama, South Carolina and Texas	.....	(b)30,488	41,988	43	1,607	23,657
Tennessee	19,745,119	19,710,103	19,207,747	16,691,777	18,965,143	18,395,256
Texas	.....	.....	3,456	2,961	105	964
Utah	66,418,370	71,370,370	101,241,114	125,185,455	142,340,215	132,150,052
Vermont	696,102	.....	.....	1,935	.....	.....
Virginia	57,008	25,087	231,971	105,313	.....	96,753
Washington	122,263	162,201	120,611	65,021	195,503	1,069,938
Wyoming	3,026,004	2,416,197	433,672	217,127	130,499	25,080
Missouri and unapportioned (c) and other states	1,299,043	1,580,831	2,159,636	603,570	685,056	452,138
	868,996,491	942,570,721	1,092,951,624	1,080,159,509	1,097,232,749	1,243,268,720

These figures are from U. S. G. S. reports.

PRODUCTION OF MICHIGAN COPPER MINES IN RECENT YEARS.

(Pounds Avoirdupois.)

	1906.	1907.	1908.	1909.	1910.	1911.	1912.	
Adventure	1,552,628	1,244,874	90,870					Adventure.
Ahmeek	3,077,507	5,510,985	6,280,241	9,198,110	11,844,054	15,196,127	16,455,769	Ahmeek.
Allouez	3,486,900	2,934,116	3,047,051	4,031,532	4,655,702	4,780,494	5,525,455	Allouez.
Atlantic	1,439,082							Atlantic.
Baltic	14,397,557	16,704,868	17,721,854	17,817,836	17,549,762	15,370,449	13,373,961	Baltic.
Calumet and Hecla	100,023,420	83,863,116	82,549,979	80,096,995	72,059,545	74,130,977	67,856,429	C & H
Centennial	2,253,015	2,373,572	2,196,377	2,583,793	1,572,566	1,493,834	2,567,385	Centennial.
Champion	16,954,986	16,489,436	17,786,763	18,005,071	19,224,174	15,639,426	17,225,508	Champion.
Franklin	4,571,570	4,401,248	3,707,518	1,615,556	966,353	820,203	1,710,651	Franklin.
Hancock						754,729		Hancock.
Isle Royale	2,937,098	2,667,608	3,011,664	5,719,056	7,567,339	7,490,120	8,186,957	Isle Royale.
Keweenaw			122,474	57,091	36,682	633,778		Keweenaw.
LaSalle						280,598		LaSalle.
Lake					318,050			Lake.
Mass	2,106,730	2,078,677	1,766,930	1,723,436	1,321,885	1,326,898	2,045,006	Mass.
Michigan	2,875,341	2,665,404	3,000,206	1,979,305		327,773	162,950	Michigan.
Mohawk	9,352,252	10,107,266	10,295,881	11,248,474	11,412,066	12,091,056	11,995,598	Mohawk.
Osceola	18,588,451	14,134,753	21,250,794	25,296,657	19,346,566	18,388,193	18,413,387	Osceola.
Quincy	16,194,838	19,796,058	20,600,361	22,511,984	22,517,014	22,252,943	20,634,800	Quincy.
Superior			21,244	1,781,315	3,181,041	3,236,233	3,921,974	Superior.
Tamarack	9,832,644	11,078,604	12,806,127	13,533,207	11,063,606	7,494,077	7,908,174	Tamarack.
Trimountain	9,507,933	8,190,711	6,034,908	5,282,404	5,694,868	6,120,417	6,908,713	Trimountain.
Victoria	546,334	1,207,237	1,290,040	1,062,218	1,164,564	1,303,331	1,224,911	Victoria.
Winona	278,182	1,285,863				1,275,675	2,307,237	Winona.
Wolverine	9,548,123	9,272,351	9,955,233	9,971,482	9,666,534	9,630,639	9,120,485	Wolverine.
Gratiot					265,869	14,275		Gratiot.
Totals (U. S. G. S. figures, including products of some other mines) (Smelter returns)	229,695,730	219,131,503	222,289,584	227,005,923	221,462,984	219,840,201	231,112,228	
Value copper	$43,791,600	$43,553,446	$29,473,844	$30,437,749	$28,280,800	$27,480,013	$35,992,837	
Value silver	148,889	197,844	127,759	148,944	178,470	263,559	324,999	
Total value	$43,940,489	$43,751,290	$29,601,603	$30,586,693	$28,459,270	$27,743,572	$36,317,836	

Most of these figures are from reports of the mining companies. The remainder are the best obtainable from other sources.

SUMMARY OF RESULTS OBTAINED IN 1908, 1909, 1910, 1911 and 1912, BY THE OUTPUT OF

		Tons of ore stamped.	Per ton of ore. Cost of mining, transportation, stamping and taxes.	Pounds of mineral obtained.	Pounds of refined copper produced.
1. C. & H. All ore	1912	2,806,610	1.91	.....	67,856,429
	1911	2,909,972	1.84	.....	74,130,977
	1910	2,795,514	1.92	.....	72,059,545
	1909	2,842,880	1.93	.....	80,095,995
	1908	2,643,938	2.15	.....	82,549,979
1. C. & H. Conglomerate	1912	1,746,960	2.23	.....	51,935,245
	1911	1,924,480	2.07	.....	58,469,399
	1910	1,950,040	2.11	.....	58,739,509
	1909	1,999,880	2.11	.....	66,285,684
	1908	1,958,200	2.25	.....	70,427,877
1. C. & H. Amygdaloid.	1912	1,040,600	1.36	.....	15,692,199
	1911	985,492	1.34	.....	15,661,578
	1910	831,194	1.41	.....	13,150,427
	1909	838,200	1.42	.....	13,752,276
	1908	685,738	1.75	.....	12,122,102
2. Tamarack	1912	421,385	2.23	12,118,038	7,908,174
	1911	392,338	2.69	12,793,430	7,494,077
	1910	525,554	2.67	22,053,480	11,063,606
	1909	689,099	2.44	20,286,174	13,533,207
	1908	654,894	2.57	19,134,429	12,806,127
3. Osceola	1912	1,246,557	1.23	24,282,312	18,413,387
	1911	1,246,596	1.14	24,452,912	18,388,193
	1910	1,217,720	1.28	25,669,913	19,346,566
	1909	1,494,845	1.36	33,107,579	25,296,657
	1908	1,241,400	1.45	26,912,944	21,250,794
4. Ahmeek	1912	652,260	1.39	23,945,315	16,455,769
	1911	598,549	1.42	21,917,925	15,196,127
	1910	530,365	1.42	16,758,521	11,844,954
	1909	406,045	1.72	12,409,042	9,198,110
	1908	298,178	1.78	8,029,960	6,280,241
5. Allouez	1912	333,618	1.613	8,787,120	5,525,455
	1911	288,610	1.668	7,532,490	4,780,494
	1910	247,119	1.769	7,406,970	4,655,702
	1909	253,049	1.806	6,384,450	4,031,532
	1908	220,905	2.051	4,716,105	3,047,051
6. Wolverine	1911–1912	401,308	1.58	12,164,780	9,408,960
	1910–1911	388,476	1.64	12,227,500	9,617,168
	1909–1910	390,837	1.61	12,359,000	9,757,101
	1908–1909	394,433	1.60	12,692,610	9,995,748
7. Mohawk	1912	787,941	1.47	15,901,500	11,995,598
	1911	802,548	1.406	15,760,700	12,091,056
	1910	902,537	1.43	15,013,500	11,412,066
	1909	819,019	1.40	14,690,200	11,248,474
	1908	685,823	1.44	13,310,820	10,295,881
8. Centennial	1912	106,517	1.92	2,567,385	1,742,338
	1911	86,543	1.869	2,321,200	1,493,834
	1910	101,133	1.9477	2,380,566	1,572,566
	1909	196,525	1.818	3,941,820	2,583,193
	1908	169,693	2.086	3,352,790	2,196,377
9. Baltic	1912	652,433	2.05	22,444,810	13,373,961
	1911	696,795	1.714	25,254,160	15,370,449
	1910	781,419	1.67	28,067,300	17,549,762
	1909	814,260	1.55	27,421,000	17,817,836
	1908	764,117	1.56	25,282,145	17,724,854

These figures are from reports of the mining companies.

18 COPPER MINES WHICH PRODUCED OVER 99 PER CENT OF THE TOTAL MICHIGAN.

Per cent refined copper in mineral.	Pounds of refined copper per ton of ore stamped.	Cost per pound at mine excluding construction.	Cost per pound construction.	Other costs per pound.	Cost per pound smelting, freight commission eastern office.	Cost per pound interest paid.	Total cost per pound, copper.	Price received for copper sold.
.....	24.18	.....	0.80	.....	.....	.....	9.86	16.65
.....	25.47	.....	.....	.....	.....	.....	8.52	12.82
.....	25.77	.....	.....	.....	.....	.....	8.96	13.20
.....	28.18	.....	.....	.....	.....	.....	8.28	13.61
.....	31.22	.....	.....	.....	.....	.....	9.00	13.62
.....	29.73	.....	.....	.....	.....	.....	8.87	16.65
.....	30.38	.....	.....	.....	.....	.....	8.25	12.82
.....	30.12	.....	.....	.....	.....	.....	8.55	13.20
.....	33.14	.....	.....	.....	.....	.....	7.77	13.61
.....	35.96	.....	.....	.....	.....	.....	8.38	13.62
.....	15.08	.....	.....	.....	.....	.....	10.36	16.65
.....	15.89	.....	.....	.....	.....	.....	9.95	12.82
.....	15.82	.....	.....	.....	.....	.....	10.53	13.20
.....	16.40	.....	.....	.....	.....	.....	10.41	13.61
.....	17.67	.....	.....	.....	.....	.....	12.25	13.62
65.26	18.8	11.90	0.0	.....	1.11	0.14	13.15	16.56
58.58	19.1	14.07	0.06	.....	1.23	0.20	15.56	12.71
50.17	21.1	12.66	0.57	.....	1.30	0.17	14.70	12.97
66.71	19.6	12.41	0.33	.....	1.18	0.38	14.30	13.32
66.93	19.6	13.14	0.64	.....	1.36	0.10	15.24	13.39
75.830	14.8	8.34	0.95	.....	1.07	.....	10.36	16.63
75.198	14.8	7.73	0.49	.....	1.06	.....	9.28	12.72
75.367	15.9	8.04	0.35	.....	0.98	.....	9.37	13.04
76.407	16.9	8.04	0.44	.....	0.99	.....	9.47	13.30
78.961	17.1	8.25	0.69	.....	1.10	.....	10.25	13.39
68.72	25.2	5.51	1.20	.....	1.14	0.00	7.85	16.61
69.33	25.4	5.61	0.32	.....	1.19	0.05	7.17	12.78
70.68	22.3	6.37	1.85	1.56	1.16	0.11	11.05	12.99
74.12	22.7	7.61	5.27	1.47	1.10	0.03	15.48	13.37
78.21	21.1	8.64	2.40	0.51	1.11	0.00	12.66	13.46
62.88	16.56	9.74	1.60	.....	1.87	0.31	13.52	16.668
63.47	16.56	10.07	0.90	.....	1.95	0.38	13.30	12.822
62.86	18.84	9.39	0.00	.....	1.81	0.37	11.57	12.68
63.14	15.93	11.34	0.21	.....	1.51	0.33	13.39	13.26
64.61	13.80	14.86	0.22	.....	1.40	0.33	16.81	13.35
.....	23.45	6.75	.....	.....	0.836	.....	7.586	14.10
78.65	24.75	6.628	0.023	.....	0.891	.....	7.542	12.58
78.947	24.96	6.453	0.03	.....	0.93	.....	7.413	13.24
.....	26.75	6.002	0.45	.....	0.923	.....	7.375	13.35
76.1	15.22	9.67	0.07	.....	0.87	.....	10.61	16.08
76.71	15.07	9.33	0.259	.....	0.81	.....	10.399	12.63
76.01	14.22	10.076	0.48	.....	.889	.....	11.44	13.09
76.57	13.73	10.22	0.01	.....	.875	.....	11.21	13.20
77.35	15.01	9.60	0.21	.....	.938	.....	10.75	13.43
67.86	16.36	11.74	0.00	.....	1.32	0.40	13.46	16.982
64.36	17.26	10.83	0.00	.....	1.43	0.43	12.69	12.842
66.05	15.40	12.65	0.00	.....	1.49	0.34	14.48	13.12
65.55	13.15	13.82	0.08	.....	1.56	0.15	15.61	13.28
65.51	12.94	16.12	0.74	.....	1.63	.....	18.49	13.39
.....	20.50	8.89	.....	.....	0.87	1.18	10.94	16.16
.....	22.06	7.46	.....	.....	0.90	0.73	9.09	12.54
.....	22.46	6.86	.....	.....	0.90	0.56	8.32	12.74
.....	21.88	6.77	.....	.....	0.89	0.32	7.98	13.00
.....	23.20	.....	.....	.....	.....	.....	7.72	13.39

SUMMARY OF RESULTS OBTAINED

		Tons of ore stamped.	Per ton of ore. Cost of mining, transportation, stamping and taxes.	Pounds of mineral obtained.	Pounds of refined copper produced.
10. Champion	1912	765,306	1.785	28,460,500	17,225,508
	1911	734,392	1.743	26,137,007	15,639,426
	1910	722,051	1.86	30,508,690	19,224,174
	1909	753,908	1.80	27,851,720	18,005,071
	1908	794,703	1.62	26,579,795	17,786,763
11. Trimountain	1912	366,663	2.057	12,417,575	6,980,713
	1911	347,885	1.819	10,705,685	6,120,417
	1910	317,299	2.00	9,598,900	5,694,868
	1909	323,408	2.09	9,118,095	5,282,404
	1908	334,929	2.05	9,634,979	6,034,908
12. Superior	1912	172,322	2.33	.....	3,921,974
	1911	162,599	2.39	.....	3,236,233
	1910	140,514	2.69	.....	3,181,041
	1909	81,641	.....	.....	1,781,315
	1908	962	.....	.....	21,244
13. Quincy	1912	1,309,253	.....	30,040,360	20,634,800
	1911	1,382,254	.....	32,550,440	22,252,943
	1910	.....	.....	34,177,380	22,517,014
	1909	.....	.....	35,025,225	22,511,984
	1908	.....	.....	32,754,745	20,600,361
14. Franklin	1912	176,462	.....	.....	1,710,651
	1911	.....	.....	.....	820,203
	1910	113,859	.....	.....	966,353
	1909	170,456	1.94	3,306,820	1,615,556
	1908	.....	.....	.....	.....
15. Isle Royale	1912	531,105	1.54	11,461,410	8,186,957
	1911	457,440	1.47	10,339,171	7,490,120
	1910	520,860	1.42	10,433,060	7,567,399
	1909	401,280	1.87	7,926,015	5,719,056
	1908	218,940	2.33	4,013,590	3,011,664
16. Victoria	1912	131,955	.....	2,033,509	1,224,911
	1911	126,894	.....	2,128,245	1,303,331
	1910	122,497	.....	1,923,599	1,164,564
	1909	118,605	.....	1,843,152	1,062,218
	1908	109,015	1.51	2,259,928	1,290,040
17. Mass	1912	132,891	.....	2,985,335	2,045,006
	1911	73,475	.....	1,949,720	1,326,898
	1910	90,747	.....	1,790,795	1,321,885
	1909	139,404	.....	.....	.....
	1908	171,268	.....	.....	.....
18. Winona	1912	181,148	.....	3,586,520	2,307,237
Total production (from U. S. G. S. Reports).	1912	11,411,941	.....	339,756,812	231,112,228
	1911	10,978,827	.....	338,908,309	219,840,201
	1910	10,869,561	.....	360,840,547	222,683,461
	1909	11,429,394	.....	358,862,935	234,136,529
	1908	10,531,271	.....	339,233,252	223,286,700

IN 1908, 1909, 1910, 1911, and 1912—CONCLUDED.

Per cent refined copper in mineral.	Pounds of refined copper per ton of ore stamped.	Cost per pound at mine excluding construction.	Cost per pound construction.	Other costs per pound.	Cost per pound smelting, freight commission eastern office.	Cost per pound interest paid.	Total cost per pound, copper.	Price received for copper sold.
.....	22.508	7.22	.....	.....	0.92	0.74	8.88	16.16
.....	21.296	7.87	.....	.....	0.86	0.90	9.63	12.54
.....	26.62	6.53	.....	.....	0.87	0.45	7.85	12.74
.....	23.88	7.10	.....	.....	0.90	0.43	8.45	13.00
.....	22.38	.....	.....	.....	.....	.....	8.34	13.39
.....	19.04	9.32	.....	.....	0.92	1.49	11.73	16.16
.....	17.59	9.79	.....	.....	0.98	0.78	11.55	12.54
.....	17.95	10.29	.....	.....	0.98	0.90	12.17	12.74
.....	16.33	11.76	.....	.....	1.04	1.09	13.89	13.00
.....	18.02	.....	.....	.....	.....	.....	12.5	13.39
.....	22.76	10.23	0.31	.....	1.97	0.24	12.75	16.997
.....	19.90	12.01	0.89	.....	2.02	0.39	15.31	12.652
.....	22.64	.....	.....	.....	.....	.....	14.29	12.63
.....	21.82	.....	.....	.....	.....	.....	.....	13.56
.....	22.08	.....	.....	.....	.....	.....	.....	.....
.....	15.7	.....	.....	.....	.....	.....	11.60	16.24
68.4	16.1	9.25	0.48	.....	0.89	.....	10.62	12.725
65.88	.....	8.80	0.50	0.25	0.93	.....	10.48	13.20
64.27	.....	8.85	0.50	0.26	0.91	.....	10.52	13.40
60.28	.....	9.615	0.58	0.23	0.85	.....	11.27	13.57
.....	9.80	.....	.....	.....	.....	.....	.....	16.794
.....	.....	.....	.....	.....	.....	.....	.....	12.516
.....	.....	.....	.....	.....	.....	.....	.....	13.33
.....	9.47	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....
71.43	15.4	10.01	0.20	0.13	1.31	0.09	11.89	16.66
72.44	16.4	8.97	0.25	0.13	1.21	0.29	10.85	12.38
72.53	14.5	9.75	0.16	0.33	1.26	0.34	11.84	12.68
72.16	14.3	13.12	1.28	0.55	1.44	0.25	16.64	13.00
75.04	13.8	16.91	9.65	0.44	1.99	0.00	28.99	13.29
.....	9.04	.....	.....	.....	.....	.....	.....	.....
.....	10.3	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	13.4	12.3
.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	11.18	12.366	.....	.....	1.97	.....	14.335	13.10
68.502	15.39	.....	.....	.....	.....	.....	.....	.....
68.055	17.58	.....	.....	.....	.....	.....	.....	12.50
73.837	14.59	.....	.....	.....	.....	.....	.....	.....
.....	12.36	.....	.....	.....	.....	.....	.....	.....
.....	10.31	.....	.....	.....	.....	.....	.....	.....
.....	12.74	.....	.....	.....	.....	.....	.....	.....
64.24	19.1	.....	.....	.....	.....	.....	.....	16.5
64.86	20.0	.....	.....	.....	.....	.....	.....	12.5
61.71	20.5	.....	.....	.....	.....	.....	.....	13.00
65.24	20.5	.....	.....	.....	.....	.....	.....	12.7
65.82	21.2	.....	.....	.....	.....	.....	.....	13.2

SUMMARY OF RESULTS OBTAINED BY MICHIGAN COPPER MINES IN 1912.

	Tons of ore stamped.	Cost of min'g trans'n and stamping per ton ore.	Pounds of concentrate obtained.	Pounds of refined copper produced.	Per cent of refined copper in concentrate.	Pounds refined copper per ton of ore stamped.	Cost per pound at mine excluding construction.	Cost per pound construction.	Cost per pound smelting f'g't com'n ent'n office.	Other costs per pound.	Cost per pound interest paid.	Total cost per pound copper produced.	Price received for copper sold.
Ahmeek	652,260	1.39	23,945,315	16,455,769	68.72	25.2	5.51	1.20	.....	1.14	0.00	7.85	16.61
Allouez	333,618	1.613	8,787,120	5,525,455	62.88	16.56	9.74	1.60	.....	1.87	0.31	13.52	16.668
Baltic	652,433	2.05	22,444,810	13,373,961	.....	20.50	8.89	.....	0.87	1.18	.....	10.94	16.16
Calumet & Hecla. All ore	2,806,610	1.91	.....	67,856,429	.....	24.18	.....	0.80	.....	.....	.....	9.86	16.65
C. & H. Conglomerate only	1,746,960	2.23	.....	51,935,245	.....	29.73	.....	.....	.....	.....	.....	8.87	16.65
C. & H. Amygdaloid only	1,040,600	1.36	.....	15,692,199	.....	15.08	.....	.....	.....	.....	.....	10.36	16.65
Centennial	106,517	1.92	2,567,385	1,742,338	67.86	16.36	11.74	0.00	.....	1.32	0.40	13.46	16.982
Champion	765,306	1.785	28,460,500	17,225,508	.....	22.508	7.22	.....	0.92	0.74	.....	8.88	16.16
Franklin	176,462	.....	.....	1,710,651	.....	9.80	.....	.....	.....	.....	.....	.....	16.794
Isle Royale	531,105	1.54	11,461,410	8,186,957	71.43	15.4	10.01	0.20	0.13	1.31	0.09	11.89	16.66
Mass	132,891	.....	2,985,335	2,045,006	68.50	15.39	.....	.....	.....	.....	.....	.....	.....
Mohawk	787,941	1.47	15,901,500	11,995,598	76.1	15.22	9.67	.....	0.87	0.07	.....	10.61	16.08
Osceola	1,246,557	1.23	24,282,312	18,413,387	75.83	14.8	8.34	0.95	.....	1.07	.....	10.36	16.63
Quincy	1,309,253	.....	30,040,360	20,634,800	.....	15.7	.....	.....	.....	.....	.....	11.60	.....
Superior	172,322	2.33	.....	3,921,974	.....	22.76	10.23	0.31	.....	1.97	0.24	12.75	16.997
Tamarack	421,385	2.23	12,118,038	7,908,174	65.26	18.8	11.90	0.0	.....	1.11	0.14	13.15	16.56
Trimountain	366,663	2.057	12,417,575	6,980,713	.....	19.04	9.32	.....	0.92	1.49	.....	11.73	16.16
Victoria	131,955	.....	2,033,509	1,224,911	.....	9.04	.....	.....	.....	.....	.....	.....	.....
Winona	181,148	.....	3,586,520	2,307,237	.....	12.74	.....	.....	.....	.....	.....	.....	.....
Wolverine (1911-1912)	401,308	1.58	12,164,780	9,408,960	.....	23.45	6.75	.....	.....	0.836	.....	7.586	14.10

FINANCIAL STATEMENTS OF MICHIGAN COPPER MINING COMPANIES.

Operating in year 1912.

	Balance of assets, Dec. 31, 1911.	Operation expenditures, 1912.	Operation receipts, 1912.	Net profits from operations, 1912.	Dividends paid, 1912.	Assessments, 1912.	Balance of assets, Dec. 31, 1912.
Adventure	$72,375 27	$40,018 75					$33,633 91
Ahmeek	1,013,812 45	1,292,179 78	$2,757,576 67	$1,465,396 89	$1,100,000 00		1,379,209 34
*Algomah	†1,134 00	53,601 94				$70,000 00	†12,299 58
Allouez	†77,700 04	729,824 60	918,435 79	188,611 19			93,564 21
Baltic	308,712 50	1,406,679 97	2,160,313 01	697,393 85	700,000 00		306,106 35
Calumet & Hecla	2,644,106 93	(?)	(?)	(?)	a4,200,000 00		4,897,414 31
Centennial	†54,061 19	227,523 86	285,075 55	57,551 69			†3,549 22
Champion	792,256 14	1,471,592 57	2,782,457 60	1,251,619 40	1,100,000 00		943,875 84
Cliff	75,756 59	16,483 68					62,571 79
Contact	20,462 39	15,430 22					17,886 04
Copper Range Consolidated	199,389 83	3,661,837 00	6,071,095 18	1,692,566 13	788,428 50		904,137 63
*Franklin	†46,687 44	403,102 57	287,285 80			332,716 00	41,839 27
Hancock		267,542 75				180,057 00	†124,288 66
Houghton	†17,426 80	48,771 44				63,255 00	3,353 46
*Indiana	74,191 24	77,867 52				80,000 00	53,060 23
Isle Royale	137,976 75	965,591 05	1,395,636 32	430,045 57			557,743 48
Keweenaw		2,389 97				200,000 00	240,659 65
Lake							
LaSalle	261,783 84	31,368 56					240,659 65
Laurium	68,532 42	51,910 33					18,465 42
Mass	30,710 63	367,420 71	348,070 52				9,347 76
Mayflower							55,646 00
Michigan	†83,572 00	30,666 00	26,509 00				†101,351 00
Mohawk	590,880 86	1,264,177 55	1,929,418 00	656,435 54	350,000 00		897,316 40
Naumkeag		18,915 46					253,000 00
‡New Arcadian	20,375 44	33,347 99					624 76
New Baltic	50,279 85	26,779 36					23,576 73
*North Lake	179,789 35	38,875 87					†13,835 30
Ojibway							
Old Colony							
Oneco						70,000 00	60,196 00

FINANCIAL STATEMENTS OF MICHIGAN COPPER MINING COMPANIES.

Operating in year 1912.

	Balance of assets, Dec. 31, 1911.	Operation expenditures, 1912.	Operation receipts, 1912.	Net profits from operations, 1912.	Dividends paid, 1912.	Assessments, 1912.	Balance of assets, Dec. 31, 1912.
Onondaga							
Osceola	$1,832,183 52	$1,908,530 00	$3,071,818 78	$1,163,288 78	$1,153,800 00		$1,888,458 05
Quincy	972,499 31	2,401,962 30	3,381,587 10	2,979,624 70	a550,000 00		1,233,278 15
South Lake	†46,055 12	39,978 11				$115,838 00	29,885 77
Superior	†73,089 06	490,559 46	673,032 04	182,472 58			99,784 08
Tamarack	851,249 02	1,028,613 28	1,300,238 89	271,625 61			1,120,861 68
Trimountain	522,921 79	783,564 75	1,127,603 33	308,472 55	300,000 00		531,394 34
Victoria	64,044 26	239,098 10	202,168 80				27,623 58
White Pine	†13,206 90						†16,701 36
Winona	146,814 01	479,094 13	376,219 76			14,770 00	62,034 00
§Wolverine	§673,339 62	§713,850 20	§1,327,030 73	§613,180 53	600,000 00		§746,520 15
Wyandot	69,267 78	31,276 29				14,405 00	‖53,704 48

*Algomah (Dow loss $28,725.66) *Franklin (Dow loss $81,393.62). *North Lake (Dow loss $160,188.17). *Indiana (Dow loss $32,702.06)
†Liabilities. ‡Year ending May 1. §Report for June 30, 1911 to June 30, 1912. ‖March 31, 1913.
aCalumet & Hecla Mining Company also retired notes amounting to $2,700,000. In addition to profits from the C. & H. mine, the company received dividends from Osceola and Ahmeek.
aQuincy Mining Company also paid $150,000 on note given St. Mary's Canal Co. for property purchased in 1910 and declared dividend of $165,000 payable March 24, 1913.

ASSESSMENTS CALLED BY MICHIGAN COPPER COMPANIES IN 1910, 1911 and 1912.

	1910.		1911.		1912.	
	Per Share.	Amount.	Per Share.	Amount.	Per Share.	Amount.
Adventure	$1 00	$100,000	$1 00	$100,000	.....	.....
Algomah	.....	.....	.....	.....	$1 00	$70,000
Franklin	.....	.....	2 00	332,652	2 00	332,652
Hancock	4 00	400,000	4 00	400,900	.....	.....
Houghton	.....	.....	.....	.....	1 00	67,000
Indiana	.....	.....	1 50	120,000	1 00	80,000
Keweenaw	.....	.....	.....	.....	1 00	200,000
King Philip	.....	.....	1 00	100,000	.....	.....
Mass	2 00	200,000	2 00	200,000	.....	.....
Mayflower	.....	.....	1 00	100,000	.....	.....
New Arcadian	0 50	75,000	.....	.....	.....	.....
Ojibway	2 00	168,000	2 00	168,000	.....	.....
Old Colony	.....	.....	1 00	100,000	.....	.....
Oneco	.....	.....	.....	.....	1 00	58,940
St. Louis	.....	.....	2 50	100,000	.....	.....
South Lake	.....	.....	.....	.....	2 00	120,000
Victoria	.....	.....	1 00	100,000	.....	.....
Winona	2 00	200,000	1 00	165,647	.....	.....
Wyandot	.....	.....	1 00	100,000	.....	.....
Total	.....	$1,143,000	.....	$2,086,299	.....	$928,592

COPPER PRODUCTION OF UNITED STATES AND MICHIGAN.

1845—1912.

Year.	United States.	Michigan.		
	Production (pounds.)	Production (pounds.)	Gross value of production.	Total dividends paid.
1845	224,000	24,880	$5,000	.....
1846	336,000	58,240	10,000	.....
1847	672,000	297,120	55,000	.....
1848	1,120,000	1,032,640	200,900	.....
1849	1,568,000	1,505,280	336,000	$60,000
1850	1,456,000	1,281,280	286,000	84,000
1851	2,016,000	1,744,960	289,500	60,000
1852	2,464,000	1,774,080	396,000	60,000
1853	4,480,000	2,905,280	648,500	90,000
1854	5,040,000	4,074,560	909,500	198,000
1855	6,720,000	5,809,334	1,586,160	168,000
1856	8,460,000	8,217,392	2,218,320	380,000
1857	10,752,000	9,530,830	2,382,500	480,000
1858	12,320,000	9,159,916	2,129,235	460,000
1859	14,112,000	8,937,995	1,950,355	360,000
1860	16,128,000	12,068,375	2,654,960	120,000
1861	16,800,000	15,182,837	3,487,995	260,000
1862	20,160,000	13,586,318	3,634,255	440,000
1863	19,040,000	12,985,444	4,415,600	720,000
1864	17,920,000	12,491,965	5,870,300	1,150,000
1865	19,040,000	14,358,592	5,635,515	510,000
1866	19,936,000	13,750,063	4,629,375	170,000
1867	22,400,000	17,515,607	4,442,841	110,000
1868	25,984,000	20,934,124	4,940,424	100,000
1869	28,000,000	26,625,301	6,230,016	210,000
1870	28,224,000	24,622,759	5,096,752	700,000
1871	29,120,000	25,746,448	5,728,485	1,640,000
1872	28,000,000	24,553,523	7,979,400	3,080,000
1873	34,700,000	30,291,505	8,726,100	2,330,000
1874	39,200,000	34,334,389	8,009,356	1,940,000
1875	40,320,000	36,039,497	8,180,625	1,920,000
1876	42,560,000	38,270,997	7,998,430	1,870,000
1877	47,040,000	39,026,671	7,327,880	1,840,000
1878	48,160,000	41,687,266	6,920,540	1,860,000
1879	51,520,000	42,671,529	7,327,350	1,818,620
1880	60,480,000	49,718,337	9,947,673	3,080,000
1881	71,680,000	54,548,909	9,971,702	2,665,000
1882	90,646,080	57,155,980	10,522,416	2,850,000
1883	115,526,053	59,702,404	9,457,853	2,670,000
1884	144,946,653	69,353,202	9,494,306	1,327,500
1885	165,875,766	72,147,889	7,942,597	1,970,000
1886	156,735,381	80,918,460	8,788,476	1,900,000
1887	180,920,524	76,028,697	8,530,342	1,370,000
1888	226,361,466	86,472,034	14,510,001	3,260,000
1889	226,775,962	88,175,675	11,894,942	2,670,000
1890	259,763,092	101,410,277	15,819,960	3,415,000
1891	284,121,764	114,222,709	14,574,727	3,540,000
1892	344,998,679	123,198,460	12,431,624	3,260,000
1893	329,354,398	112,605,078	12,105,145	3,520,000
1894	354,188,374	114,308,870	10,852,122	2,380,000
1895	380,613,404	129,330,749	13,877,109	3,280,000
1896	460,061,430	143,524,069	15,758,935	3,985,000
1897	494,078,274	145,282,059	16,530,843	5,431,000
1898	526,512,987	158,491,703	17,829,871	6,857,250
1899	568,666,921	147,400,338	26,098,382	12,318,450
1900	606,117,166	145,461,498	23,691,928	9,811,200

COPPER PRODUCTION, 1845—1912. (*Concluded.*)

Year.	United States.	Michigan.		
	Production (Pounds)	Production (Pounds)	Gross value of production.	Total dividends paid.
1901.....	602,072,519	156,289,481	$26,038,857	$7,496,900
1902.....	659,508,644	170,609,228	20,711,592	3,440,000
1903.....	698,044,517	192,400,577	26,383,449	4,980,000
1904.....	812,537,267	208,309,130	27,107,107	5,432,300
1905.....	888,784,267	230,287,992	36,616,586	9,224,600
1906.....	917,805,682	229,695,730	43,044,732	13,911,500
1907.....	868,996,491	219,131,503	43,319,940	13,469,950
1908.....	942,570,721	222,289,584	30,239,253	4,837,300
1909.....	1,092,951,624	227,005,923	31,256,141	6,309,200
1910.....	1,080,159,509	221,462,984	29,072,951	6,974,000
1911.....	1,097,232,749	219,840,201	27,743,572	5,376,125
1912.....	1,243,268,720	231,112,228	36,317,836	9,901,875
Total value of Mich. production and dividends.			$790,911,248	$198,102,770

WORLD'S PRODUCTION OF COPPER.*

(In tons of 2,240 lbs.)

	1909.	1910.	1911.
Africa—			
Cape Co	4,645	4,405	4,480
Namaqua	2,300	2,500	2,500
Sundries	8,000	8,300	10,000
Argentina	600	300	1,020
Australia	34,400	40,315	41,840
Austria	1,615	2,130	2,440
Bolivia, Coro-Coro	2,000	2,500	1,800
Canada	24,105	25,715	24,930
Chili	35,785	35,235	25,595
Cuba	2,960	3,475	4,455
England	435	500	500
Germany—Mansfield	18,715	19,995	20,520
Other German	3,470	4,715	1,490
Hungary, including Servia and Bosnia	4,600	4,955	6,970
Italy	2,725	3,220	2,600
Japan	47,000	46,000	55,000
Mexico—Boleo	12,230	12,795	12,165
Other Mexican	44,095	48,720	41,865
Newfoundland	1,380	1,080	1,155
Norway—Sulitelma	4,295	4,925	3,590
Other Norwegian	4,785	5,500	5,835
Peru	16,000	18,305	25,445
Russia	17,750	22,310	25,570
Sweden	2,000	2,000	2,000
Spain and Portugal—			
Rio Tinto	35,370	33,575	34,500
Tharsis	4,355	3,495	3,395
Mason & Barry	2,365	2,955	2,920
Sevilla	1,820	1,630	1,530
Other mines	8,275	8,600	9,700
United States	490,280	484,935	492,650
Turkey	800	600	1,000
Total	839,425	855,685	873,460

*Figures issued by Henry R. Merton & Co., London.

PRODUCTION OF COPPER IN THE UNITED STATES.*

According to class. (In pounds.)

Year.	Lake.	Electrolytic (d).	Casting (d).	Pig Copper (a).	Total.
1904	208,329,248	705,478,400	b45,000,000	44,408,000	1,003,215,648
1905	219,000,000	c760,000,000	46,000,000	33,495,000	c1,058,494,000
1906	224,071,000	c860,000,000	52,000,000	29,098,000	c1,165,169,000
1907	220,317,041	854,441,000	47,957,000	30,032,000	1,152,747,890
1908	222,267,444	850,660,325	44,967,250	35,000,000	1,152,895,019
1909e	226,602,134	1,101,518,458	67,471,446	43,159,018	1,438,751,056
f1910	221,400,864	1,151,624,597	g55,673,196	49,903,463	1,475,602,120
1911	216,412,867	1,156,627,311	22,977,534	35,920,626	1,431,938,338
1912	221,400,864	1,151,624,597	32,193,196	46,903,463	1,452,122,120

*From Metal Statistics, 1913.

(a) Exported. (b) Estimated. (c) Partly estimated. (d) Included copper from scrap and junk. (e) The statistics for 1909 are officially communicated by the Copper Producers' Association, except that to its report of 34,123,446 lbs. of casting copper there has been added 33,348,000 lbs. reported by the junk smelters. The term "Lake" copper is here used to designate all copper sold in the trade as such regardless of the process by which it is refined. (f) Copper Producers' Association through Engineering and Mining Journal, May 6, 1911. (g) Includes 23,480,000 lbs. from scrap.

PRICE OF COPPER AT NEW YORK.

(In cents per pound.)

	Electrolytic.						Lake.					
	1907.	1908.	1909.	1910.	1911.	1912.	1907.	1908.	1909.	1910.	1911.	1912.
January	24.404	13.726	13.893	13.620	12.295	14.094	24.825	13.901	14.280	13.870	12.680	14.337
February	24.896	12.905	12.949	13.322	12.256	14.084	25.236	13.098	13.295	13.719	12.611	14.329
March	25.065	12.704	12.387	13.255	12.139	14.698	25.560	12.875	12.826	13.586	12.447	14.868
April	24.224	12.743	12.562	12.733	12.019	15.741	25.260	12.928	12.937	13.091	12.275	15.930
May	24.048	12.598	12.893	12.550	11.989	16.031	25.072	12.788	13.238	12.885	12.214	16.245
June	22.665	12.675	13.214	12.404	12.385	17.234	24.140	12.877	13.548	12.798	12.611	17.443
July	21.130	12.702	12.880	12.215	12.463	17.190	21.923	12.933	13.363	12.570	12.720	17.353
August	18.356	13.462	13.007	12.490	12.405	17.498	19.255	13.639	13.206	12.715	12.634	17.644
September	15.565	13.388	12.870	12.379	12.201	17.508	16.047	13.600	13.210	12.668	12.508	17.698
October	13.169	13.354	12.700	12.553	12.189	17.314	13.551	13.646	13.030	12.788	12.370	17.661
November	13.391	14.130	13.125	12.742	12.616	17.326	13.870	14.386	13.354	12.914	12.769	17.617
December	13.163	14.111	13.298	12.581	13.552	17.376	13.393	14.411	13 647	12.863	13.768	17.600
Year	.....	13.208	12.982	12.738	12.376	16.341	.....	13.424	13.335	13.039	12.634	16.560

VISIBLE STOCKS OF COPPER.

(On first day of each month.)

	United States.				Europe.			
	1909.	1910.	1911.	1912.	1909.	1910.	1911.	1912.
January	122,357,266	141,766,111	122,030,195	89,454,697	124,716,480	244,204,800	236,629,120	158,323,200
February	144,130,045	98,463,339	142,439,490	66,280,643	118,574,400	248,236,800	236,992,000	154,851,200
March	173,284,248	107,187,992	156,637,770	62,939,988	117,140,800	254,150,400	233,385,600	141,142,400
April	182,279,902	123,824,874	162,007,934	62,367,557	115,024,000	249,625,600	223,014,400	136,819,200
May	183,198,073	141,984,159	165,555,908	65,066,029	114,050,320	246,870,400	212,284,800	134,176,000
June	169,848,141	160,425,973	165,995,932	49,615,643	127,352,960	239,142,400	202,540,800	117,801,600
July	154,858,061	168,386,017	157,434,164	44,335,004	150,928,960	232,892,800	195,932,800	108,186,000
August	122,596,607	170,640,678	137,738,858	50,280,421	171,492,160	222,320,000	191,891,840	113,299,200
September	135,196,930	168,881,245	133,441,501	46,701,374	197,993,600	218,444,800	191,228,800	113,568,000
October	151,472,772	148,793,714	140,894,856	46,701,374	210,224,000	211,276,800	191,945,600	107,408,000
November	153,509,626	139,261,914	134,997,642	76,744,964	222,566,400	198,060,800	176,825,600	103,801,600
December	153,003,527	130,389,069	111,785,188	86,164,059	236,857,600	193,200,000	164,281,600	96,947,200
January	.....	.....	.....	105,312,582	.....	.....	.....	96,857,600

U. S. PRODUCTION AND DELIVERIES OF COPPER IN 1912.*

(In pounds.)

	Production.	Domestic deliveries.	Export deliveries.	Total deliveries.	Surplus stock on first day of following month.
Jan.....	119,337,753	62,343,901	80,167,904	142,511,805	66,280,643
Feb.....	116,035,809	56,228,368	63,148,096	119,376,464	62,939,988
Mar.....	125,694,601	67,487,466	58,779,566	126,267,032	62,367,557
Apr.....	125,464,644	65,513,846	53,252,326	122,766,172	65,066,029
May.....	126,737,836	72,702,277	69,485,945	142,188,222	49,615,643
June.....	122,315,240	11,146,229	61,449,650	127,595,879	44,335,004
July.....	137,161,129	71,094,381	60,121,331	131,215,712	50,280,421
Aug.....	145,628,521	78,722,418	70,485,150	149,207,568	46,701,374
Sept.....	140,089,819	63,460,810	60,264,796	123,725,606	63,065,587
Oct.....	145,405,453	84,104,734	47,621,342	131,726,076	76,744,964
Nov.....	134,695,440	69,369,795	59,906,550	125,276,345	86,164,059
Dec.....	143,354,042	58,491,723	65,713,796	124,205,519	105,312,582
Total for 1912....	1,582,150,244	819,477,517	750,162,833	1,566,062,400	
Total for 1911...	1,431,938,338	709,611,605	754,902,233	1,464,513,838	

*From Copper Producers' Statements.

POTASH.

For the past two or three years, the U. S. Geological Survey has been prosecuting a most diligent search after commercial supplies of potash salts, the United States at present being wholly dependent upon foreign countries. The salt producing districts of Michigan were visited and an examination of the brines, both natural and artificial, was made. The results were not at all encouraging. The percentage of potash in the brines was so small as to indicate that as far as the present salt producing regions are concerned, evaporation had never been carried far enough to cause a deposition of any of the more soluble salts. Many years ago, the Canadian Survey carried on a similar investigation with like barren results, finding little or no evidence warranting a supposition that potassium salts might even be found in the brines and salt deposits in Ontario.

It must be admitted, however, that the evidence while not favorable is certainly altogether too meager for concluding that there is no possibility of potash salts being found within the limits of the state. The investigation covered only a limited and marginal portion of the probable salt bearing areas and there is good reason to believe that the central portion of the state may also be salt bearing, and in this area, we know nothing concerning the Salina or possible salt beds.

The many drillings in southeastern Michigan and in Ontario, penetrating the Salina, have more or less perfectly outlined the southeastern limits of the rock salt beds. In a rough way, the margin extends slightly north of east from Trenton, Wayne county, where the Church wells show the exact southern edge of the salt beds, into Ontario apparently lapping around the margin of the old Cincinnati anticline which runs northeastward through Essex and Kent counties. To the northwest, in Michigan, the last well which penetra es the Salina is the Royal Oak which shows the surprising thickness of 609 ft. of salt, much thicker than to the southeast. From Detroit to Port Huron, there appears to be from 300 to 400 ft. of salt as shown by the wells. From these facts, it is but natural to infer that there is at least a very considerable extension of the salt beds to the northwest and down the dip of the strata toward the central basin. It is also to be noted that toward the north the salt comes in at higher horizons.

At Grand Lake, Alpena county, there is over 300 ft. of salt and the well was not through the formation. At Manistee and Ludington,

the salt beds do not total more than 20 to 30 ft. To the south at Muskegon and to the north at Frankfort, the salt was absent. Dr. C. W. Cook in his studies upon the salt deposits of Michigan appears to think that there is good grounds for believing that the Manistee-Ludington, the Alpena, and the much larger southeastern district are simply but parts of one and the same deposit. If this is the case, presumably much of the central basin is underlain by salt beds.

Obviously, since the soluble potash salts are the last to be deposited, the chances for finding bitterns or deposits of potash would be greater toward the central basin, rather than toward the marginal areas such as the Port Huron-Detroit, Manistee and Alpena districts.

In order that one may form a better idea of the possibilities for the occurrence of potash salts in Michigan, the following excerpt from Dr. W. H. Sherzer's report on Wayne County is given below. It is to be noted that, while several plausible theories have been advanced in explanation of the deposition of salt, and especially the more soluble compounds of potash, bromine, etc., there is probably more to the history of the real processes than given in the various theories.

"The frequent association of calcium and magnesium carbonate, calcium sulphate and the strong bitter brines with rock salt, as in the region just described, gave rise more than a century ago to the theory that they must all have originated from the evaporation, under arid conditions, of detached arms of the sea. To account, however, for such extensive beds of salt, gypsum and dolomite demanded depths for these inland seas which overtaxed one's belief. Furthermore, the deposits alternated in succession and were often interstratified with shale and sandstone, so that the simple evaporation of such a sea could furnish no adequate explanation.

"Laboratory experiments have shown that, when sea water is evaporated, there are first thrown down the calcium carbonate ($CaCO_3$) (and hydrous oxide of iron); ($2Fe_2O_3 - 3H_2O$); next about 84% of the calcium sulphate ($CaSO_4$) in solution. There is next precipitated upon further concentration about 54% of the salt (NaCl) along with the balance of the calcium sulphate, followed by 8.5% of salt free from this sulphate. The remaining salt with the more soluble compounds of magnesium, potassium, bromine and iodine, finally crystallized in various combinations, or constitute the bittern in case evaporation was not complete. As pointed out by Hubbard when such simple concentration of an inland sea takes place the bottom and sides would be coated with calcium carbonate, more or less stained with iron, upon which would be deposited a layer of gypsum or anhydrite. The concentrated brine would shrink to the deeper portions of the basin and there be precipitated along with more gypsum, the

final salt layers being practically pure. If the evaporation were not completed, the bittern, or "mother liquor," would remain as a concentrated mineral water, to be incorporated into subsequent deposits. To account for a succession of the above series, for irregularities and for shale and sandstone, it has been supposed that influxes of the sea took place as during storm, or exceptionally high tides, bringing in fresh supplies of sea water and incidentally mud and sand. The enormous thickness of any single deposit, however, can not be so explained.

"In 1877 Ochsenius proposed a modification of this theory by assuming a basin of sufficient depth which continuously maintained its connection with the adjacent ocean, the water of the basin evaporating and allowing a constant inflow of sea water. The concentrated surface layers will sink, encountering layers differently charged and giving rise to the deposition of various compounds, chiefly salt and gypsum. Given sufficient time, a basin of sufficient original depth or in process of slow subsidence, the continuance of uniform conditions and an extensive bed of any of the above substances might take place. This is the theory accepted by Hubbard as explaining most satisfactorily the Salina series of Michigan.

"Grabau has recently pointed out that according to this theory there should be found abundant remains of marine organisms in the strata enclosing the salt, and it would seem, even in the salt itself. The constant influx of sea water would sweep in countless forms whose remains would settle to the bottom, whether or not they had been able to maintain themselves alive for any considerable time in the water undergoing concentration. It has already been pointed out that the Salina strata are practically barren of fossils. Grabau further calls attention to the absence of marine strata, outside of the Salina area of Michigan, Ontario and New York, which might be regarded as contemporary with the salt and gypsum strata. The complete absence of such strata, this author convincingly argues, indicates a land-locked basin or series of such in which the Salina beds are to be laid down. Widespread desert conditions with intermittent streams; long continued erosion of pre-Salina strata containing imprisoned sea-salts; the solution, transportation and final concentration of these salts in the various basins, he believes most satisfactorily explains all the phenomena of the Salina. From computations, this author concludes that the erosion of 400 ft. of Niagara limestone from Minnesota, Wisconsin, the upper Great Lake region and western Ontario would be sufficient to yield 100 ft. of pure rock salt distributed over an area of 25,000 square miles."

From the foregoing discussion of theories and facts relating to salt deposits, it is evident that, in any case, the final "mother liquor" or

bitterns containing potash, would be largely collected in pools in local depressions, more or less close to the center of the Basin, that these pools would form only a very small part of the total area of the salt and that a single deep drilling might not necessarily prove the absence of potash salts, as there would be relatively large barren areas in between the pools. If the potash was not deposited in the solid form, but remained to be included in later deposits, the occurrence of the potash brines would naturally be much more wide-spread than the potash salts and a single drilling would have a greater chance of being successful.

During the present year, serious consideration has been given to the project of putting down from one to three deep wells to the Salina to test the possibilities for the occurrence of potash salts or brines in Saginaw Valley. Upon request, a report summarizing and describing the available evidence was submitted by the Survey and the parties interested decided that, as yet, the evidence was too vague and indefinite to warrant so costly an exploration so fraught with risk without having state aid, and protection, in case success was obtained.

At the present time, a drilling to the Niagara, Clinton and Medina formations is being considered with a view of testing the oil possibilities of these formations as well as the potash of the Salina. It would probably require a hole at least 4,400 ft. deep to reach the Niagara and one 4,850 ft. to reach the Clinton, if the formations below the Dundee are at all regular in character and thickness.

SAND AND GRAVEL.

Since 1903 the statistics concerning the production and value of sand and gravel in Michigan have been collected in co-operation with the U. S. Geological Survey. A study of these tables as given in the present report shows a steady and rapid increase in the total production and value up to 1911 when there was a great decline, from 2,862,738 short tons valued at $816,377 in 1910 to 1,831,601 tons valued at $523,829. For this there was no apparent reason, when it is considered that a great era of road building has just been inaugurated. This branch of the industry should have shown a very marked increase instead of a decline from 1,197,791 short tons in 1910 valued at $364,841 to 560,069 tons valued at only $158,876 in 1911.

A careful examination of the lists of the producers disclosed the fact that a large proportion of the producers reporting were located in or near cities or towns. There were very few indeed of the reports from rural communities, even where state reward road building was in progress. It is evident that the reports up to this year inclusive, represent chiefly the industry as developed in the vicinity of cities.

In the spring of 1912, in co-operation with the State Highway Department and the U. S. Geological Survey, form letters were sent to all of the township highway commissioners in the state, some 1,300 or more, asking the location and character of the sand and gravel pits and the names and addresses of the various owners. The results were somewhat startling as the number of new producers sent in by the commissioners swelled the sand and grave directory from about 125 to more than 3,000.

From the nature of the replies, it is clearly indicated that an enormous amount of road sand and gravel has been handled in the rural communities, of which hitherto there has been no record. It is to be hoped that the reports from 1913 on will more nearly represent the status of the industry in the state as a whole.

Plans are already under way to make an examination of the sand and gravel pits in the state in order to determine their fitness and value for concrete-cement work. Much complaint has been made against cement in such concrete work and, nearly always, when a careful examination has been made, the fault is not in the cement but with the sand or gravel used.

PRELIMINARY STATEMENT ON LIMESTONE.

The last detailed report upon the limestones of Michigan appeared in Annual Report for 1901 by Dr. A C. Lane. Short notes were published in several of the later reports, but nothing in a comprehensive way.

At present most of the known reserves of good limestone, easily accessible, are in the hands of a few large companies. Michigan has a number of heavy limestone formations, but unfortunately the amount of high grade limestone in each is relatively very small. In such case, it is no little problem to discover just where this much sought for stone occurs in commercially important quantities and under favorable conditions for quarrying. Were it not for the drift, which hopelessly covers most of the state, it would be comparatively easy to locate inexhaustible supplies of limestone. The Dundee alone in Monroe and Wayne counties would supply an almost unlimited amount of limestone, suitable for nearly every purpose for which limestone is adapted.

During the present summer (1913), R. A. Smith, Assistant State Geologist of the Survey is devoting a large part of his time in making a detailed study of the various limestone outcrops in the state with a view of determining their character and the uses to which they may be best suited, and the regions which offer the more favorable chances for the development of limestone deposits of commercial size and grade.

STATISTICAL TABLES.

1912

Iron ore.	Silver.
Pig iron.	Sand lime brick.
Portland cement.	Lime.
Salt.	Pottery.
Brick and tile.	Mineral water.
Coal.	Trap rock.
Limestone.	Sandstone.
Sand and gravel.	Clay
Gypsum.	Natural gas.

Compiled from reports of the United States Geological Survey, Division of Mineral Resources. Statistics for 1910-1912 collected by Michigan Geological Survey and United States Geological Survey in coöperation, iron ore and coal excepted for the year 1912.

COMPARATIVE TABLE SHOWING PRODUCTION OF IRON ORE IN THE UNITED STATES, THE LAKE SUPERIOR REGION AND MICHIGAN.

	Total[2] shipments Lake Superior Region. Long tons.	Total[4] production United States. Long tons.	Total[3] shipments Michigan. Long tons.	Per cent total.		Percent of Lake Superior Region. Michigan.
				Lake Superior Region.	Michigan.	
1854	3,000	.....	33,000[1]	.....	.....	100
1855	1,449	.....	1,449	.....	.....	100
1856	36,343	.....	6,343	.....	.....	100
1857	25,646	.....	25,646	.....	.....	100
1858	15,876	.....	22,876	.....	.....	100
1859	68,832	.....	68,832	.....	.....	100
1860	114,401	2,873,460	114,401	4.0	4.0	100
1861	49,909	.....	49,909	.....	.....	100
1862	124,169	.....	124,169	.....	.....	100
1863	203,055	.....	203,055	.....	.....	100
1864	243,127	.....	243,127	.....	.....	100
1865	236,208	.....	186,208	.....	.....	100
1866	278,796	.....	278,796	.....	.....	100
1867	473,567	.....	443,567	.....	.....	100
1868	491,449	.....	491,454	.....	.....	100
1869	617,444	.....	617,444	.....	.....	100
1870	830,940	3,831,891	830,934	21.7	21.7	100
1871	779,607	.....	779,607	.....	.....	100
1872	900,901	.....	893,169	.....	.....	100
1873	1,162,458	.....	1,153,249	.....	.....	100
1874	919,557	.....	919,257	.....	.....	100
1875	891,257	4,017,857	889,477	22.2	22.2	100
1876	992,764	.....	1,006,785	.....	.....	100
1877	1,015,087	.....	1,010,494	.....	.....	100
1878	1,111,110	.....	1,023,083	.....	.....	100
1879	1,375,691	.....	1,130,019	.....	.....	100
1880	1,908,745	7,120,362	1,384,010	26.8	19.5	72.5
1881	2,306,505	7,119,643	2,121,558	32.4	29.8	91.8
1882	2,965,412	8,700,000	2,689,395	34.1	30.9	90.6
1883	2,353,288	8,800,000	2,291,115	26.7	26.0	97.3
1884	2,518,692	7,718,129	2,420,068	32.6	31.3	96.1
1885	2,466,372	7,600,000	2,192,243	32.4	28.8	88.8
1886	3,568,022	10,000,000	3,157,213	35.7	31.6	88.5
1887	4,730,577	11,300,000	4,004,328	41.8	35.4	85.5
1888	5,063,693	12,062,530	4,159,780	41.9	34.4	82.1
1889	7,292,754	14,518,041	5,660,495	50.2	38.8	77.6
1890	9,012,379	16,036,043	7,144,290	56.2	44.6	79.3
1891	7,062,233	14,591,178	5,754,339	48.5	39.4	81.4
1892	9,069,556	16,296,666	7,166,429	55.6	43.8	79.0
1893	6,060,492	11,587,629	4,417,155	52.3	38.1	72.8
1894	7,748,932	11,879,679	4,633,308	65.2	39.0	59.7
1895	10,429,037	15,957,614	5,916,026	65.4	37.1	56.7
1896	9,934,828	16,005,449	5,469,851	62.1	34.1	55.1
1897	12,469,638	17,518,046	6,381,301	71.1	36.4	51.1
1898	14,024,673	19,433,716	7,375,310	72.1	37.8	52.5
1899	18,251,804	24,683,173	9,307,585	73.9	37.7	50.8
1900	19,059,393	27,553,161	9,072,109	69.1	32.9	47.5
1901	20,589,237	28,887,479	9,190,349	71.3	31.8	44.6
1902	27,571,121	35,554,135	11,255,287	77.5	31.6	40.8
1903	24,289,878	35,019,308	9,154,147	69.3	26.1	37.6
1904	21,822,839	27,644,330	7,805,880	78.9	28.2	35.7
1905	34,384,116	42,526,133	11,684,432	80.8	27.4	33.9

COMPARATIVE TABLE SHOWING PRODUCTION OF IRON ORE IN THE UNITED STATES, THE LAKE SUPERIOR REGION AND MICHIGAN.

(Concluded.)

	Total shipments Lake Superior Region. Long tons.	Total production United States. Long tons.	Total shipments Michigan. Long tons.	Per cent total.		Percent of Lake Superior Region. Michigan.
				Lake Superior Region.	Michigan.	
1906	38,565,762	47,749,728	12,149,451	80.7	25.4	31.5
1907	42,266,668	51,720,619	12,166,929	81.7	23.5	28.7
1908	26,014,987	35,983,336	7,302,060	72.2	20.3	28.1
1909	42,586,869	51,294,271	12,251,965	83.0	23.8	28.7
1910	43,442,397	57,014,906	11,955,105	76.3	20.9	27.5
1911	32,793,130	43,876,552	8,898,327	74.7	20.3	27.1
1912	48,221,546	55,150,147	12,428,361	87.4	22.5	25.7
Total.	573,808,218	.....	242,449,183	.....	.....	42.2

[1]Includes 30,000 tons for years unknown.
[2]Iron Trade Review.
[3]Monograph No. 52, U. S. G. S.
[4]Mineral Resources of the United States, U. S. G. S. and Michigan Geological Survey.

NOTE.—There are disagreements for early years in the first and third columns of figures taken from different sources. Prior to 1880 Michigan produced the entire Lake Superior output.

IRON ORE RESERVES OF MICHIGAN BY COUNTIES, 1911-1913.[1]

County.	Reserves reported by companies.		Tons estimated by appraiser.		Area of ore on bottom level—square feet.	
	1911.	1913.	1911.	1913.	1911.	1913.
Gogebic...	17,354,100	23,840,028	31,605,000	31,567,579	670,000	970,779
Iron.....	11,403,113	39,055,589	33,623,842	60,785,916	2,425,730	3,341,882
Dickinson..	10,250,422	10,782,036	11,650,450	12,783,452	263,465	324,975
Baraga....	1,864,185	741,185	2,074,000	1,891,035	310,600	135,775
Marquette.	51,589,357	46,817,825	90,626,810	82,439,239	13,031,805	10,815,518
Total....	92,461,177	121,236,663	169,581,102	189,467,621	16,701,600	15,588,929

[1]Estimated for Michigan State Tax Commission by C. K. Leith 1911, and R. C. Allen, 1913.

VALUE OF MICHIGAN SHIPMENTS OF IRON ORE BY COUNTIES IN 1912.[1]

County.	Tons shipped.	Valuation.	Value per ton.
Gogebic	4,094,938	$10,763,458 47	$2.628
Iron	3,041,705	5,926,876 69	1.948
Dickinson	1,585,601	3,246,722 21	2.048
Baraga	53,943	68,774 74	1.275
Marquette	3,873,109	8,856,986 81	2.286
Total	12,649,296	$28,862,818 92	$2.281

[1]Value figured as gross receipts from ore sales less freights and selling commissions, as reported to Michigan State Tax Commission by the producers.

TABLES SHOWING DECREASE IN QUANTITY OF BESSEMER ORES AND IN IRON CONTENT OF SHIPMENTS FROM LAKE SUPERIOR REGION, 1902—1912.

Average Iron of Bessemer Ores.*

	Gogebic Range.			Marquette Range.			Menominee Range		
Year.	Average iron (Natural).	Average phosphorus.	Per cent of Bessemer.	Average iron (Natural).	Average phosphorus.	Per cent of Bessemer.	Average iron (Natural).	Average phosphorus.	Per cent of Bessemer.
1912	54.2386	0.04100	64.1	54.9180	0.04033	15.0	55.2117	0.02522	2.5
1911	54.5312	0.04000	73.3	54.0668	0.03746	31.1	54.5578	0.03302	3.7
1910	54.1441	0.04122	80.0	55.0838	0.04490	25.5	53.6310	0.04323	5.0
1909	53.6578	0.04227	73.9	57.1386	0.04539	25.8	53.2389	0.04180	7.4
1908	53.9843	0.04185	72.5	55.9672	0.04485	32.7	55.6941	0.03457	4.0
1907	53.8365	0.04112	81.1	56.7992	0.04539	24.1	56.6136	0.03425	4.3
1906	54.2732	0.04162	85.3	56.5151	0.04851	27.3	55.8979	0.03630	6.0
1905	54.7369	0.04093	90.2	57.5585	0.04616	27.1	56.8037	0.03197	4.6
1904	55.2144	0.04002	86.6	58.6219	0.04296	30.1	57.5432	0.02687	4.2
1903	55.9185	0.03889	84.8	57.2475	0.04488	38.5	57.7853	0.02084	4.0
1902	55.7324	0.04184	87.5	58.2631	0.04239	29.9	57.7141	0.01674	2.8

	Vermillion Range.			Mesabi Range.			Total Bessemer.		
Year	Average iron (Natural).	Average phosphorus.	Per cent of Bessemer.	Average iron (Natural).	Average phosphorus	Per cent of Bessemer.	Average iron (Natural).	Average phosphorus.	Per cent of Bessemer.
1912	59.3095	0.03847	74.9	53.2513	0.04645	45.3	53.9009	0.04504	41.9
1911	59.5940	0.03837	82.8	52.9224	0.04620	49.3	53.6151	0.04438	46.6
1910	60.1133	0.03745	78.2	53.3587	0.04608	46.3	53.9313	0.04472	44.8
1909	60.3218	0.03904	81.7	53.2625	0.04528	48.0	53.8686	0.04446	45.1
1908	60.4392	0.03913	83.9	54.0142	0.04459	57.2	54.4690	0.04387	53.0
1907	60.1411	0.03750	92.6	54.0681	0.04558	63.2	54.6064	0.04437	56.4
1906	60.1254	0.03934	89.3	54.6196	0.04408	69.0	55.0834	0.04354	60.2
1905	60.6082	0.03857	85.7	55.3543	0.04215	70.1	55.7627	0.04183	60.9
1904	60.0113	0.04031	94.5	56.3171	0.04010	79.9	56.6337	0.04018	65.1
1903	60.4775	0.04098	84.6	55.8573	0.04044	74.9	56.4388	0.04043	63.7
1902	61.5522	0.03983	80.1	56.6690	0.03948	80.6	57.1109	0.03995	64.9

*Compiled by W. L. Tinker, Secretary Lake Superior Iron Ore Association.

AVERAGE IRON (NATURAL) OF NON-BESSEMER ORES.

Year.	Gogebic Range.	Marquette Range.	Menominee Range.	Vermillion Range.	Mesabi Range.	Total Old Range.
1912....	53.2912	52.7308	51.0527	58.7775	49.4922	52.5245
1911....	52.9294	52.4737	51.4315	59.5984	49.4934	52.2184
1910....	52.5195	52.7952	51.0734	60.2483	49.7468	51.2185
1909....	51.9749	52.9033	51.3061	61.2379	49.8474	52.2074
1908....	52.2528	52.2748	50.9742	61.2246	50.8403	51.9414
1907....	52.5835	52.9362	51.4400	63.9432	51.4601	52.3503
1906....	51.8580	53.9861	52.2508	64.5798	50.8088	53.2308
1905....	52.1136	54.3907	52.8159	64.3330	51.6239	53.8529
1904....	53.1802	54.7825	53.7339	66.4676	52.3964	54.3229
1903....	52.3980	54.0844	53.8048	62.9809	53.1948	54.2675
1902....	53.7872	55.1032	54.1020	61.9984	53.5531	54.9995

IRON CONTENT OF TOTAL BESSEMER AND NON-BESSEMER ORES.

Year.	Old Range average iron (Natural).	Mesabi Range average iron (Natural).	All Ranges Average iron (Natural).	Total non-Bessemer average iron (Natural).
1912.....	53.7116	51.1958	51.9603	50.5043
1911.....	53.6164	51.1842	51.8869	50.3792
1910.....	53.5219	51.4195	52.0703	50.5574
1909.....	53.4921	51.4864	52.1130	50.6696
1908.....	53.6255	52.6552	52.9551	51.2484
1907.....	54.0103	53.1100	53.4020	51.8434
1906.....	54.6248	53.4386	53.8652	52.0235
1905.....	55.1910	54.2392	54.6072	52.8077
1904.....	55.7600	55.4493	55.5791	53.6115
1903.....	55.9153	55.1884	55.5049	53.8449
1902.....	56.3991	56.0663	56.2233	54.5778

ANNUAL LAKE ERIE PRICES, FREIGHT RATES AND MINE VALUES OF MICHIGAN IRON ORES, 1855-1913.[1]

Year.	Marquette Range..									
	Rail freight.		Boat freight.		Price at Lake Erie ports.		Value of ore at the mines.			
							Shipped via Marquette.		Shipped via Escanaba.	
	To Marquette.	To Escanaba.	From Marquette.	From Escanaba.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.
1855	$3 00	.....	$3 00	.....	$10 00	$10 00	$4 00	$4 00	.....	.....
1856	1 27	.....	3 00	.....	8 00	8 00	3 73	3 73	.....	.....
1857	1 27	.....	2 67	.....	8 00	8 00	4 06	4 06	.....	.....
1858	87	.....	2 09	.....	6 50	6 50	3 54	3 54	.....	.....
1859	87	.....	2 00	.....	6 00	6 00	3 13	3 13	.....	.....
1860	1 09	.....	2 00	.....	5 25	5 50	2 16	2 41	.....	.....
1861	1 09	.....	2 21	.....	5 25	5 00	1 95	1 70	.....	.....
1862	1 09	.....	2 89	.....	5 25	5 37	1 27	1 39	.....	.....
1863	1 09	.....	3 19	.....	7 50	7 50	3 22	3 22	.....	.....
1864	1 09	.....	3 37	.....	8 50	8 50	4 04	4 04	.....	.....
1865	1 10	.....	3 23	.....	7 50	7 50	3 17	3 17	.....	.....
1866	1 10	$1 55	4 17	$3 77	{ 9 50	.....	4 23	.....	$4 23	.....
					{ 14 00	4 23	8 73	4 18	8 68	.....
1867	1 10	1 80	2 98	3 28	10 50	{ 8 00	.....	3 92	.....	$2 92
						{ 11 50	6 42	7 42	5 42	6 42
1868	1 10	1 80	3 11	2 44	8 25	8 25	4 04	4 04	4 20	4 20
1869	1 10	1 85	3 21	2 43	8 25	9 50	3 94	5 19	3 97	5 22
1870	1 10	1 85	3 06	2 40	8 50	{ 8 50	.....	4 34	.....	4 25
						{ 9 50	4 34	5 34	4 25	5 25
1871	95	1 70	2 83	2 07	8 00	8 00	4 22	4 22	4 23	4 23
1872	84	1 70	3 59	2 50	9 00	7 50	4 57	3 07	4 80	3 30
1873	84	2 00	3 44	2 74	12 00	9 00	7 72	4 72	7 26	4 26
1874	84	2 00	3 84	.....	9 00	7 00	4 32	2 32	.....	.....
1875	65	1 25	2 87	.....	7 00	5 50	3 48	1 98	.....	.....
1876	55	1 15	2 54	.....	6 75	4 50	3 66	1 41	.....	.....
1877	55	1 15	1 40	.....	6 50	4 25	4 55	2 30	.....	.....
1878	55	1 15	1 26	85	5 50	4 25	3 69	2 44	3 50	2 25
1879	55	1 15	1 61	1 07	6 25	4 75	4 09	2 59	4 03	2 53
1880	55	1 25	2 50	1 77	9 25	8 00	6 20	4 95	6 23	4 98
1881	55	1 25	2 25	1 55	9 00	7 00	6 20	4 20	6 20	4 20
1882	55	1 25	1 50	1 22	9 00	6 25	6 95	4 20	6 53	3 78
1883	55	1 10	1 30	1 11	6 25	5 00	4 40	3 15	4 04	2 79
1884	40	80	1 21	98	5 76	4 50	4 15	2 89	3 98	2 72
1885	45	80	1 01	84	5 50	4 25	4 04	2 79	3 86	2 61
1886	55	80	1 35	1 16	5 50	4 75	3 60	2 85	3 54	2 79
1887	55	80	1 75	1 49	7 25	5 25	4 95	2 95	4 96	2 96
1888	45	70	1 22	97	5 50	4 75	3 83	3 08	3 83	3 08
1889	45	70	1 14	1 00	5 50	4 50	3 91	2 91	3 80	2 80
1890	45	70	1 16	99	6 75	5 75	5 14	4 14	5 06	4 06
1891	45	70	96	74	6 00	4 74	4 59	3 34	4 56	3 31
1892	40	65	1 06	87	5 50	4 85	4 04	3 39	3 98	3 33
1893	40	65	85	70	4 25	{ 3 00	.....	1 75	.....	1 65
						{ 3 50	3 00	2 25	2 90	2 15
1894	32	.....	70	53	2 75	2 15	1 73	1 13	.....	.....

[1]Compiled from various sources.

ANNUAL LAKE ERIE PRICES, FREIGHT RATES AND MINE VALUES OF MICHIGAN IRON ORES, 1855-1913.[1]

(Continued.)

Year.	Marquette Range.									
	Rail freight,		Boat freight.		Price at Lake Erie ports.		Value of ore at the mines.			
							Shipped via Marquette.		Shipped via Escanaba.	
	To Marquette.	To Escanaba.	From Marquette.	From Escanaba.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.
1895	$0 32	$0 52	$0 83	$0 64	$2 75 3 50	$2 15 2 30	$1 60 2 35	$1 00 1 15	$1 59 2 34	$0 99 1 14
1896	32	52	80	61	4 00	2 45 2 85	.....	1 33 1 73	.....	1 32 1 72
1897	32	52	60	45	2 65	2 00 2 60	2 88	1 08 1 68	2 78	1 03 1 63
1898	32	40	60	48	3 10 3 35	2 35 2 45	1 73 2 18 2 43	1 43 1 53	1 68 2 22 2 47	1 47 1 57
1899	25	40	84	72	3 21 3 50	2 50	2 12 2 41	..... 1 41	2 09 2 38	..... 1 38
1900	25	40	94	85	5 93 6 48	..... 5 00	4 74 5 29	..... 3 81	4 68 5 23	..... 3 75
1901	25	40	74	62	4 66 4 92	3 65 3 85	3 67 3 93	2 66 2 86	3 64 3 90	2 63 2 83
1902	25	40	68	59	4 65 5 00	3 80 4 00	3 72 4 07	2 87 3 07	3 66 4 01	2 81 3 01
1903	25	40	73	63	4 85 5 15	4 00 4 25	3 87 4 17	3 02 3 27	3 82 4 12	2 97 3 22
1904	25	40	61	54	3 60 3 85	3 10 3 35	2 74 2 99	2 24 2 49	2 66 2 91	2 16 2 41
1905	32	40	70	60	3 75	3 20	2 73	2 18	2 75	2 20
1906	32	40	70	60	4 25	3 70	3 23	2 68	3 25	2 70
1907	32	40	70	60	5 00	4 20	3 98	3 18	4 00	3 20
1908	32	40	60	50	4 50	3 70	3 58	2 78	3 60	2 80
1909	32	40	60	50	4 50	3 70	3 58	2 78	3 60	2 80
1910	32	40	65	55	5 00	4 20	4 03	3 23	4 05	3 25
1911	.....	.....	55	45	4 50	3 70	.....	.....	.....	.....
1912	.....	.....	.....	.....	3 75	3 00	.....	.....	.....	.....
1913	.....	.....	.....	.....	4 40	3 60	.....	.....	.....	.....

[1]Compiled from various sources.

ANNUAL LAKE ERIE PRICES, FREIGHT RATES AND MINE VALUES OF MICHIGAN IRON ORES, 1855-1913.[1]

(Concluded.)

Year.	Menominee Range.						Gogebic Range.					
	Rail freight.	Boat freight.	Price of ore at Lake Erie ports.		Value of ore at the mines.		Rail freight.	Boat freight.	Price of ore at Lake Erie ports.		Value of ore at the mines.	
	To Escanaba.	From Escanaba.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.	To Ashland.	From Ashland.	Bessemer.	Non-Bessemer.	Bessemer.	Non-Bessemer.
1883	.....	.....	$6 00	$4 75	.....	.....	.....	.....	.....	.....	.....	.....
1884	.....	.....	5 25	4 50	.....	.....	.....	.....	.....	.....	.....	.....
1885	.....	.....	4 75	4 00	.....	.....	.....	.....	.....	.....	.....	.....
1886	.....	.....	5 25	4 50	.....	.....	.....	.....	.....	.....	.....	.....
1887	$0 85	$1 49	6 00	5 00	$3 66	$2 66	$0 80	$2 11	$6 00	$5 00	$3 09	$2 09
1888	75	97	4 75	4 00	3 03	2 28	70	1 34	4 75	4 00	2 71	1 96
1889	75	1 00	4 50	4 50	2 75	2 75	70	1 29	4 50	4 50	2 51	2 51
1890	.....	99	5 50	5 25	4 51	4 26	70	1 26	5 50	5 25	3 54	3 29
1891	70	74	4 50	4 25	3 06	2 81	65	1 05	4 50	4 25	2 80	2 55
1892	70	87	4 50	3 65	2 93	2 08	65	1 20	4 50	3 65	2 65	1 80
1893	70	70	3 85	3 20	2 41	1 76	65	88	3 85	3 20	2 32	1 67
1894	70	53	2 75	2 50	1 52	1 27	52	.....	.....	.....	1 44	1 19
							65	79	2 75	2 50	1 31	1 06
1895	52	64	2 90	2 25	1 74	1 09	52	96	2 90	2 25	1 42	77
1896	52	61	4 00	2 70	2 87	1 57	52	91	4 00	2 70	2 57	1 27
1897	52	45	2 60	2 15	1 63	1 18	45	.....	.....	.....	1 52	1 45
							52	63	2 60	2 15	1 07	1 00
1898	45	48	2 75	1 85	1 82	92	40	.....	.....	.....	84	1 69
							45	61	2 75	1 85	1 74	79
1899	40	72	3 00	2 15	1 88	1 03	40	95	3 00	2 15	1 65	80
1900	40	85	5 50	4 25	4 25	3 00	40	1 05	5 50	4 25	4 05	2 80
1901	40	62	4 25	3 00	3 23	1 98	40	84	4 25	3 00	3 01	1 76
1902	40	59	4 25	3 25	3 30	2 26	40	76	4 25	3 25	3 09	2 09
1903	40	63	4 50	3 60	3 47	2 57	40	83	4 50	3 60	3 27	2 37
1904	40	54	3 25	2 75	2 31	1 81	40	70	3 25	2 75	2 15	1 65
1905	40	60	3 75	3 20	2 75	2 20	40	76	3 75	3 20	2 59	2 04
1906	40	60	4 25	3 70	3 25	2 70	40	75	4 25	3 70	3 10	2 55
1907	40	60	5 00	4 20	4 00	3 20	40	75	5 00	4 20	3 85	3 05
1908	40	50	5 00	4 20	4 10	3 30	40	65	5 00	4 20	3 95	3 15
1909	40	50	4 50	3 70	3 60	2 80	40	65	4 50	3 70	3 45	2 65
1910	40	55	5 00	4 20	4 05	3 25	40	70	5 00	4 20	3 90	3 10
1911	40	45	4 50	3 70	.....	.....	40	60	4 50	3 70	.....	.....
1912	40	45	3 75	3 00	2 90	2 15	40	55	3 75	3 00	.....	.....
1913	40	45	4 40	3 60	3 55	2 70	40	55	4 40	3 60	.....	.....

[1]Compiled from various sources.

COMPARATIVE ASSESSED IRON MINE VALUATIONS, 1911-1913.*

GOGEBIC COUNTY.

City of Ironwood.

Name of Mine.	Description.	1911.	1912.	1913.
Ashland	S. ½ S. W. ¼ 22-47-47	$162,000	$145,800	$145,000
Norrie	S ½ S. E. ¼ 22-47-47	1,864,000	1,757,700	66,000
East Norrie	W. ½ S. W. ¼ 23-47-47	3,648,000	3,445,200	1,377,954
North Norrie	N. ½ S. E. ¼ 22	.....	.....	2,466,607
Aurora	E. ½ S. W. ¼ 23	3,972,000	3,749,800	1,814,519
Vaughan	N. ½ S. E. ¼ 23	.....	.....	116,104
Pabst	S. ½ N. E. ¼ 23	5,107,000	4,806,300	5,862,243
North Aurora	S. ½ N. W. ¼ 23	.....	.....	194,250
Total Norrie group		$14,591,000	$13,759,000	$12,042,677
Newport	N. W. ¼ 24-47-47	8,535,000	7,935,400	7,996,800
Total	City of Ironwood	$23,288,000	$21,840,200	$20,039,477

Erwin Township.

Name of Mine.	Description.	1911.	1912.	1913.
Bonnie	N. E. ¼ 24-47-47	$610,000	$630,000	$399,664
	S. E. ¼ S. E. ¼ 13-47-47	.....	.....	25,000
Total		$610,000	$630,000	$424,664

Bessemer Township.

Name of Mine.	Description.	1911.	1912.	1913.
Davis	N. ½ N. W. ¼ 19-47-46	$23,000	$20,000	$20,000
Eureka	N. ½ N. W. ¼ 13-47-46	35,800	35,800	35,800
Geneva	S. W. ¼ 18-47-46	21,000	35,000	75,000
Asteroid	N. E. ¼ 13-47-46	8,000	35,000	48,600
Puritan	S. W. ¼ 17-47-46	81,000	81,000	81,000
Houghton Co. Lease	S. ½ S. W. ¼ 11-47-46	.....	.....	25,000
Royal	S. E. ¼ 18-47-46	.....	10,000	40,000
Keweenaw	S. ½ S. E. ¼ 11-47-46	.....	50,000	334,425
Ironton	W. ½ E. ½ 17-47-46	115,600	102,500	137,206
Anvil	N. E. ¼ 14-47-46	132,900	500,000	437,913
Total		$417,300	$869,300	$1,234,944

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COMPARATIVE ASSESSED IRON MINE VALUATIONS.—Continued.

GOGEBIC COUNTY.—*Continued.*

City of Bessemer.

Name of Mine.	Description.	1911.	1912.	1913.
Winona	E. ½ E. ½ 17-47-46	$77,000	$69,000	$92,150
Yale	S. ½ N. W. ¼ 16-47-46	432,000	326,300	400,000
Colby	N. E. ¼ 16-47-46	877,500	862,000	751,517
Tilden	N. ½ 15-47-46	200,000	170,000	150,000
Palms	N. W. ¼ 14-47-46	265,800	950,000	962,100
Total		$1,852,300	$2,377,300	$2,355,767

Wakefield Township.

Name of Mine.	Description.	1911.	1912.	1913.
Mikado	N. W. ¼ and N. W. of N. E. 18-47-45	$135,000	$135,000	$57,960
Pilgrim Lease Wakefield Expl.	S. ½ N. ½ and N. ½ S. ½ 17 and W. ½ N. W. and N. W. of S. W. of 16-47-45			752,800
Castile	E. ½ 10-47-45	25,000	50,000	58,111
Brotherton	N. ½ S. E. and S. E.-N. E. 9-47-45	954,000	250,000	202,400
Sunday Lake	W. ½ 10-47-45	989,000	1,007,000	708,750
Pike	S. E. N. W. and S. W. N. E. 9-47-45			25,000
Chicago	E. ½ N. E. of 8 and W. ½ N. W. of 9-47-45	67,500	67,500	50,000
Total		$2,170,500	$1,509,500	$1,855,021

SUMMARY.

Location of Mine.	1911.	1912.	1913.
City of Ironwood	$23,288,000	$21,840,200	$20,039,477
Erwin Township	610,000	630,000	424,664
Bessemer Township	417,300	689,300	1,234,944
City of Bessemer	1,852,300	2,377,300	2,355,767
Wakefield Township	2,170,500	1,509,500	1,855,021
Total	$28,338,100	$27,226,300	$25,909,873

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—Continued.

DICKINSON COUNTY.

Name of Mine.	1911.	1912.	1913.
Aragon	$578,000	$473,225	$609,757
Breen	16,500	16,500	10,000
Chapin	4,988,000	4,863,000	4,050,000
Federal	.....	80,000	60,000
Forest	.....	5,000	10,000
Indiana	.....	15,000	15,000
Loretto	269,000	251,900	288,009
Millie	56,000	56,000	56,000
Munro	20,000	20,000	21,900
Penn	1,200,000	1,200,000	953,720
Pewabic	300,000	300,000	339,940
Pine Bluff, No. 1	.....	.....	10,000
Pine Bluff, No. 2	.....	.....	15,000
Calumet	.....	.....	29,200
Vivian	.....	.....	15,000
Clifford (including Traders & Cornell)	.....	.....	100,000
Total	$7,427,500	$7,260,625	$6,583,517

BARAGA COUNTY.

Spurr Township.

Name of Mine.	1912.	1913.
Imperial	$20,000	$95,000
Webster	20,000	20,000
Ohio Norwood	5,000	40,000
Portland	18,000	48,000
Titan	20,000	5,000
Pittsburgh & Lake Angeline	2,000	2,000
Sheldon Estate	3,500	3,500
Spurr	6,000	6,000
Stuart	10,000	10,000
Longyear	2,285	2,285
Sheldon & Douglass	3,000	3,000
Total	$109,785	$235,585

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—*Continued.*

IRON COUNTY

Mastodon Township.

Name of Mine.	1911.	1912.	1913.
Alpha	$225	$303,400	$1,080,000
Carpenter	375	53,100	.....
Longyear	775	72,900	.....
Mastodon	750	67,800 67,800	.....
S. E. ¼ N. W. ¼ 13-42-33, not including triangular 5 A. of N. E. corner	.....	.....	751,050
E. ½ S. E. ¼ 12-42-33	.....	.....	4,016
N. W. ¼ S. W. ¼ 13 and E. ½ S. E. ¼ 14-42-33	.....	.....	26,372
S. W. ¼ of N. W. ¼ 13-42-33	.....	.....	600,715
S. ½ N. E. ¼, Sec. 12-42-33	.....	.....	100,000
Oliver Iron Mining Co.			
Total	$2,125	$565,000	$2,562,153

Crystal Falls Township.

Name of Mine.	1911.	1912.	1913.
Armania	$196,600	$156,000	$37,500
Amasa-Porter	50,000	180,000	173,377
Crystal Falls	73,000	75,000	27,900
Dunn	108,000	108,000	72,580
Dunn Exploration	.....	.....	32,000
Hill Top	.....	.....	5,000
Monongahela-Carpenter	50,000	300,000	396,240
McDonald	.....	.....	37,462
Tobin	1,195,000	1,050,000	903,880
Victoria	.....	.....	5,000
S. W. ¼ N. W. ¼ 31-43-32	.....	.....	50,000
N. E. ¼ S. E. ¼ 36-43-33	.....	.....	50,000
Total	$1,672,600	$1,869,000	$1,790,939

Mansfield Township.

Name of Mine.	1911.	1912.	1913.
Hollister	$216,000	$75,000	$50,000
Mansfield.			
Total	$216,000	$75,000	$50,000

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—*Continued.*

IRON COUNTY—*Continued.*

Hematite Township.

Name of Mine.	1911.	1912.	1913.
Channing	$30,000	$5,000	$5,000
Hemlock	68,000	51,000	148,527
Michigan	63,000	32,000	32,000
Warner	.....	.....	20,000
Total	$161,000	$88,000	$205,527

City of Crystal Falls.

Name of Mine.	1911.	1912.	1913.
Bristol	$865,000	$552,864	$899,422
Great Western	474,000	474,000	129,366
Great Western Extension	54,000	18,500	22,400
Kimball S. E. of N. E. of 29 only	.....	.....	35,000
Lamont Lot 6 Sec. 20	.....	.....	3,000
Neeley Exploration	25,000	25,000	65,750
Ravenna	8,000	100,000	81,152
Youngstown	150,000	150,000	179,280
Lot 3 20-43-32	.....	.....	8,000
May Lot 6 Sec. 28-43-32	.....	.....	33,750
Lot 7 Sec. 28-43-32	.....	.....	6,000
S. W. of S. W. Sec. 28-43-32	.....	.....	3,000
N. W. of S. W. Sec. 28-43-32	.....	.....	3,000
Fairbanks:			
N. E. of S. E. 43-32	.....	.....	25,000
Lot 5 20-43-32	.....	.....	3,000
Lot 4 20-43-32	.....	.....	2,500
Total	$1,576,000	$1,320,364	$1,499,620

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—*Concluded.*

IRON COUNTY—*Continued.*

Stambaugh Township.

Name of Mine.	1911.	1912.	1913.
Andrew Young Lease			$10,000
Berkshire	$216,000	$216,000	251,134
Baltic & Fogarty	1,375,000	800,000	834,637
Corry			6,870
Caspian	3,955,000	3,861,200	3,648,000
Chatham	45,000	45,000	176,044
Cortland	1,000	30,000	40,000
Cottrell			20,000
DeGrasse			5,000
Houlihan	1,139,000	1,139,000	
(Bengal)			782,077
Hiawatha	125,000	102,000	60,050
Lennox			4,000
Riverton	632,000	501,000	1,141,070
Tully	704,000	704,000	944,468
(Baker)			33,000
Wickwire	1,000	145,000	56,700
Youngs	375,000	345,000	208,591
Zimmerman	481,000	481,000	795,202
Total	$9,049,000	$8,369,200	$9,016,843

Bates Township.

Name of Mine.	1911.	1912.	1913.
Blair	$121,500	$121,500	$277,472
Michaels			107,640
Bates	45,000	80,000	80,000
Chicagon	57,600	44,000	44,000
Erickson	81,000	81,000	170,818
Rogers	414,000	414,000	726,303
Total	$719,000	$740,500	$1,406,233

Iron River Township.

Name of Mine.	1911.	1912.	1913.
Arenson	$25,000	$40,000	$68,508
Davidson, No. 1	173,000	173,000	437,346
Davidson, No. 2	173,000	225,000	
Homer (Donahue	97,500	97,500	427,856
McGovern)	97,500	97,500	
Minkler	1,500	11,000	361,000
Jones & Laughlin (Forbes)	450,000	450,000	618,678
Osana	623,000	597,000	794,452
Purcell			20,000
Sherwood	2,000	750,000	1,034,784
Virgil	1,700	50,000	95,800
Wauseca	52,200	52,200	141,620
Total	$1,696,400	$2,543,200	$4,000,044

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—*Continued.*

MARQUETTE COUNTY.

Ishpeming City.

Name of Mine.	1911.	1912.	1913.
Lake & Moro	$3,250,000	.....	$2,677,500
Salisbury	166,500	.....	117,000
Cliff Shaft	2,574,000	.....	1,961,000
Iron Mountain	.....	.....	36,500
Lake Superior Hard Ore	994,000	.....	967,000
Sec. 16 Mine	4,050,000	.....	3,237,600
Hematite L. S	.....	.....	25,000
Lake Angeline	500,000	.....	102,214
Total	$11,534,500	.....	$9,123,814

Negaunee City.

Name of Mine.	1911.	1912.	1913.
Breitung, No. 1	$592,000	.....	$670,300
Breitung, No. 2	75,000	.....	75,000
Milwaukee-Davis	.....	.....	20,000
Maas	4,505,000	.....	2,687,000
Athens (Harvey Lots)	560,000	.....	829,500
Jackson	250,000	.....	250,000
Rolling Mill	900,000	.....	702,000
Lucky Star	560,000	.....	546,000
Mary Charlotte	1,660,000	.....	854,000
Himrod	.....	.....	75,000
Negaunee Mine	5,950,000	.....	4,555,000
Race Course	255,000	.....	300,000
D. S. S. & A. Right of Way	.....	.....	253,500
Queen Group { Prince of Wales	963,000	.....	709,700
Queen Group { Blue	.....	.....	213,000
Cambria	585,000	.....	576,000
Total	$16,855,000	.....	$13,316,000

Ispheming Township.

Name of Mine.	1911.	1912.	1913.
Lloyd	$110,000	.....	$90,000
Sec. 6 Exploration	.....	.....	311,000
Total	$110,000	.....	$401,000

COMPARATIVE ASSESSED IRON MINE VALUATIONS.—*Continued.*

MARQUETTE COUNTY—*Continued.*

Tilden Township.

Name of Mine.	1911.	1912.	1913.
Cascade Sec. 19	.....	.....	$1,500
Sec. 21 Mine	$1,870,000	.....	1,587,000
Mitchell	10,000	.....	15,000
Total	$1,880,000	.....	$1,603,500

Forsyth Township.

Name of Mine.	1911.	1912.	1913.
Stegmiller	$110,500	.....	$93,500
Princeton, No. 1	70,000	.....	24,400
Princeton, No. 2	525,000	.....	565,000
Austin	425,000	.....	280,000
Stephenson	357,000	.....	228,000
C. & N. W. Expl. Sec. 19	8,500	.....	10,000
C. & N. W. Expl. Sec. 21	85,000	.....	20,000
C. & N. W. Expl. Sec. 29	42,500	.....	20,000
Francis	42,500	.....	42,500
Jopling	85,000	.....	100,000
Gwinn	204,000	.....	195,500
Gardner	76,500	.....	70,000
Mackinaw	119,000	.....	70,000
Total	$2,150,500	.....	$1,718,900

Ely Township.

Name of Mine.	1911.	1912.	1913.
American Boston	$115,000	.....	$315,000
Morris	112,000	.....	154,500
Chase	135,000	.....	40,000
Barnes & Hecker	135,000	.....	51,000
Total	$497,000	.....	$560,500

Republic Township.

Name of Mine.	1911.	1912.	1913.
Republic	$942,000	.....	$1,040,000
Champion, Champion Township	652,000	.....	652,000
Barron, Humboldt Township	.....	.....	50,000

COMPARATIVE ASSESSED IRON MINE VALUATIONS—*Concluded.*

MARQUETTE COUNTY—*Concluded.*

Richmond Township.

Name of Mine.	1911.	1912.	1913.
Cascade, Sec. 29			$42,000
Cascade, Sec. 19			1,500
Star West			10,000
Empire	$20,000		20,000
Richmond	104,000		122,600
Volunteer			66,400
Total	$124,000		$262,500
Grand total	$34,745,000		$28,728,214
Total for State (1913)			$81,988,548

SUMMARY OF IRON ORE SHIPMENTS FROM MICHIGAN RANGES. (GROSS TONS).

Range.	1880 and prior years.	1881.	1882.	1883.	1884.
Marquette	13,849,627	1,564,823	1,797,896	1,291,695	1,554,477
Gwinn	79,840	15,011	31,498	13,730	3,557
Menominee	943,535	541,724	756,594	712,150	663,425
Crystal Falls	.....	.....	42,111	70,866	66,175
Iron River	.....	.....	31,595	129,590	90,204
Gogebic	.....	.....	.....	.....	1,022
Metropolitan	.....	.....	23,854	43,845	37,581
Calumet	.....	.....	5,847	29,239	3,627
Total	14,873,002	2,121,558	2,689,395	2,291,115	2,420,068
	1885.	1886.	1887.	1888.	1889.
Marquette	1,430,362	1,619,052	1,848,792	1,923,667	2,642,813
Gwinn	.....	8,328	2,142	.....	.....
Menominee	567,805	592,443	786,244	637,182	947,124
Crystal Falls	23,990	185,680	172,665	230,282	314,229
Iron River	55,693	86,366	116,006	115,744	180,340
Gogebic	114,393	658,951	1,069,409	1,249,415	1,575,989
Metropolitan	.....	6,393	9,070	3,490	.....
Calumet	.....	.....	.....	.....	.....
Total	2,192,243	3,157,213	4,004,328	4,159,780	5,660,495
	1890.	1891.	1892.	1893.	1894.
Marquette	2,993,663	2,504,941	2,637,453	1,816,797	2,060,260
Gwinn	.....	7,301	29,403	19,096	.....
Menominee	1,233,700	1,053,772	1,338,659	1,128,238	866,804
Crystal Falls	527,038	504,928	603,048	220,969	37,515
Iron River	159,494	81,082	46,921	3,917	.....
Gogebic	2,230,395	1,601,266	2,510,945	1,228,138	1,668,729
Metropolitan	.....	1,049	.....	.....	.....
Calumet	.....	.....	.....	.....	.....
Total	7,144,290	5,754,339	7,166,429	4,417,155	4,633,308
	1895.	1896.	1897.	1898.	1899.
Marquette	2,091,245	2,604,221	2,715,035	3,099,792	3,701,208
Gwinn	6,593	.....	.....	25,247	55,802
Menominee	1,471,543	1,139,996	1,516,004	1,816,638	2,348,205
Crystal Falls	202,600	288,209	284,986	356,268	716,971
Iron River	17,955	3,419	146	5,009	44,346
Gogebic	2,126,090	1,434,006	1,865,130	2,072,356	2,441,053
Metropolitan	.....	.....	.....	.....	.....
Calumet	.....	.....	.....	.....	.....
Total	5,916,026	5,469,851	6,381,301	7,375,310	9,307,585

SUMMARY OF IRON ORE SHIPMENTS FROM MICHIGAN RANGES. (GROSS TONS.)

(Continued.)

	1900.	1901.	1902.	1903.	1904.
Marquette	3,382,495	3,178,295	3,749,977	2,956,022	2,767,242
Gwinn	75,037	67,051	118,048	84,223	76,461
Menominee	2,312,779	2,660,030	3,001,189	2,528,819	1,712,800
Crystal Falls	720,066	696,844	1,003,785	824,461	917,969
Iron River	139,278	157,541	355,110	276,785	284,273
Gogebic	2,422,454	2,419,144	3,018,255	2,465,263	2,042,398
Metropolitan	.....	11,444	8,923	18,574	4,737
Calumet	.....	.....	.....	.....	.....
Total	9,072,109	9,190,349	11,255,287	9,154,147	7,805,880

	1905.	1906.	1907.	1908.	1909.
Marquette	4,086,493	3,935,293	3,907,955	2,214,782	3,983,436
Gwinn	129,079	166,894	380,118	199,850	272,736
Menominee	2,741,169	2,953,131	2,498,784	1,254,110	1,991,108
Crystal Falls	1,174,366	1,395,910	1,631,484	629,602	1,425,261
Iron River	337,973	568,469	589,946	630,745	1,152,076
Gogebic	3,215,352	3,113,981	3,093,083	2,348,626	3,402,415
Metropolitan	.....	.....	13,913	9,123	24,933
Calumet	.....	15,773	51,646	15,222	.....
Total	11,684,432	12,149,451	12,166,629	7,302,060	12,251,965

	1910.	1911.	1912.	Total.
Marquette	3,840,129	2,614,881	3,406,646	99,771,455
Gwinn	552,597	345,877	510,398	3,275,917
Menominee	1,674,447	1,431,840	1,538,746	49,360,737
Crystal Falls	1,206,592	1,254,135	1,304,739	19,033,744
Iron River	1,001,969	1,115,514	1,736,966	9,514,463
Gogebic	3,652,918	2,102,322	3,883,011	61,046,509
Metropolitan	26,462	33,758	12,468	289,617
Calumet	.....	.....	35,387	156,741
Total	11,955,105	8,898,327	12,428,361	242,449,183

SHIPMENTS OF IRON ORE FROM MICHIGAN RANGES BY COUNTIES.
(GROSS TONS.)

County.	1890 and prior years.	1891.	1892.	1893.	1894.
Gogebic	6,899,574	1,601,266	2,510,945	1,228,138	1,668,729
Iron	2,598,068	586,010	649,969	224,886	37,515
Dickinson	8,547,872	1,054,821	1,338,659	1,128,238	866,804
Marquette	32,542,296	2,493,690	2,659,662	1,835,893	2,060,260
Baraga	128,677	18,552	7,194	.....	.....
Total	50,716,487	5,754,339	7,166,429	4,417,155	4,633,308

	1895.	1896.	1897	1898.	1899.
Gogebic	2,126,090	1,434,006	1,865,130	2,072,356	2,441,053
Iron	220,555	291,628	285,132	361,277	761,317
Dickinson	1,471,543	1,139,996	1,516,004	1,816,638	2,348,205
Marquette	2,097,838	2,604,221	2,715,035	3,125,039	3,733,775
Baraga	.....	.....	.....	.....	23,235
Total	5,916,026	5,469,851	6,381,301	7,375,310	9,307,585

	1900.	1901.	1902.	1903.	1904.
Gogebic	2,442,454	2,419,144	3,018,255	2,465,263	2,042,398
Iron	859,344	854,385	1,358,895	1,101,246	1,202,242
Dickinson	2,312,779	2,671,474	3,010,112	2,547,393	1,717,537
Marquette	3,393,618	3,241,008	3,808,244	2,905,597	2,817,195
Baraga	63,904	4,338	59,781	134,648	26,508
Total	9,072,099	9,190,349	11,255,287	9,154,147	7,805,880

	1905.	1906.	1907.	1908.	1909.
Gogebic	3,215,352	3,113,981	3,093,083	2,348,626	3,402,415
Iron	1,512,339	1,964,379	2,221,430	1,260,347	2,577,337
Dickinson	2,741,169	2,968,904	2,564,343	1,278,455	2,016,041
Marquette	4,175,605	4,097,111	4,154,288	2,305,366	3,888,055
Baraga	39,967	5,076	133,785	109,266	368,117
Total	11,684,432	12,149,451	12,166,929	7,302,060	12,251,965

	1910.	1911.	1912.
Gogebic	3,652,918	2,102.322	3,883,011
Iron	2,208,552	2,369,649	3,041,705
Dickinson	1,700,909	1,465,598	1,585,601
Marquette	4,236,311	2,871,116	3,864,101
Baraga	156,415	89,642	53,943
Total	11,955,105	8,898,327	12,428,361

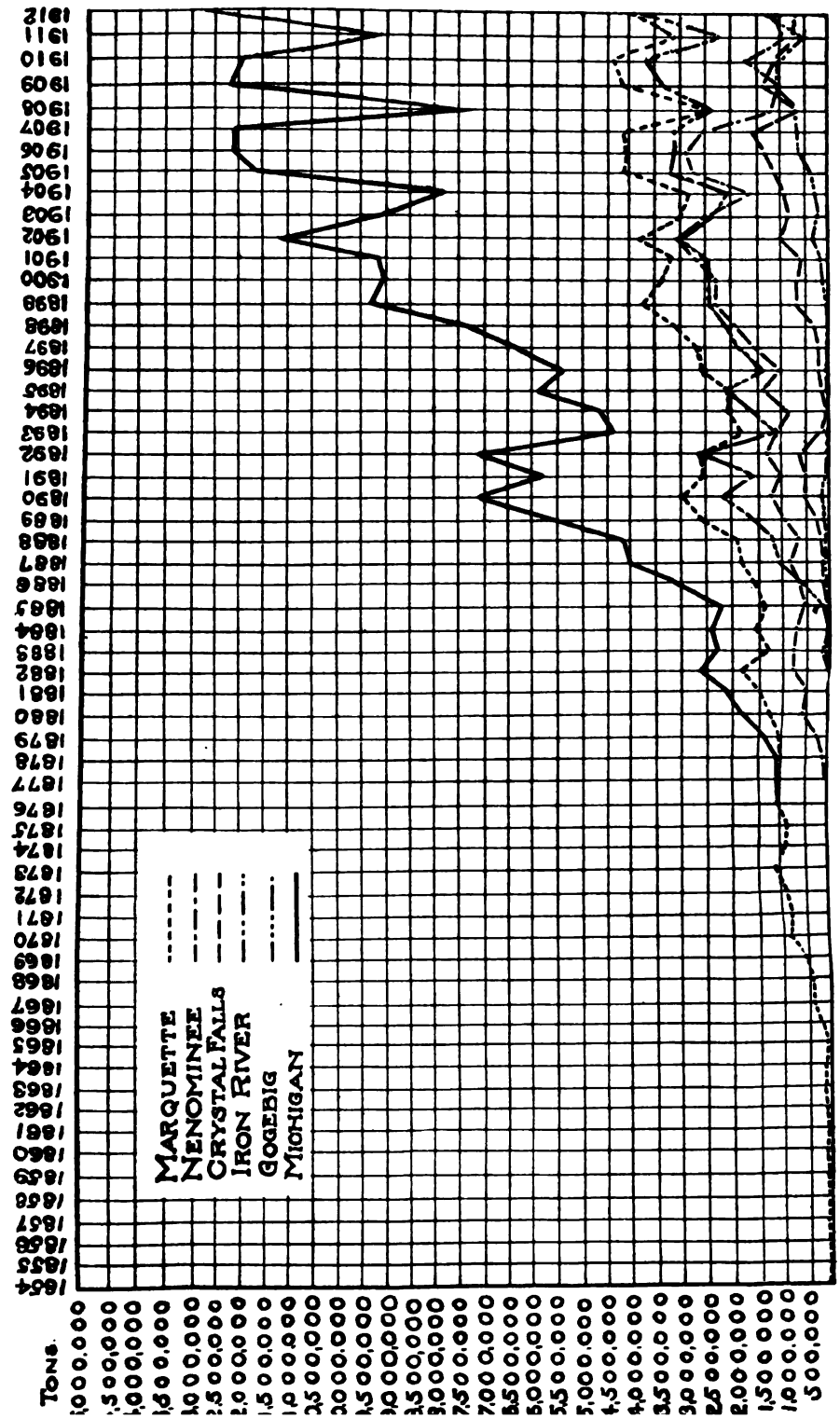

FIG. 1.— PRODUCTION CURVES FOR MICHIGAN IRON RANGES, 1854-1912.

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.

Name of Mine.	1870 and prior years.	1871.	1872.	1873.
American (Sterling)				
Ames				
Barnum (Cliff Shaft)[1]	92,662	45,939	38,381	48,076
Bay State				
Bessemer (See Lillie)				
Bessie				
Beaufort (Ohio)				
Blue (See Queen Group)				
Boston (with American)				
Braastad { Mitchell			197	8,658
Braastad { Winthrop	3,469	11,088	14,239	33,456
Breitung No. 1				
Breitung Hematite No. 2				
Buffalo[2]				
Cambria				
Champion	100,951	67,588	68,408	72,782
Chester (See Rolling Mill)				
Chicago				
Cleveland[3]	724,771	142,658	151,724	133,265
Cleveland Hematite (Included under Cleveland)				
Cleveland Cliffs Group[4]				
Columbia (Kloman)				21,065
Curry				
Dalliba (Phoenix)				
Detroit				
Dexter				
Dey				
East Champion				10,426
East New York				
Edison				
Edwards (See Sampson)				
Empire				
Erie				
Etna				
Fitch				
Foster[5]	43,998	13,532	18,684	18,107
Foxdale				
Gibson				
Goodrich				
Grand Rapids (Davis)				
Green Bay (See Bay State)				
Hartford				
Hortense (North Champion)				
Home (P. and L. S.) (Now Volunteer)			1,160	21,498
Humboldt (Washington)	219,353	48,725	38,841	38,014
Imperial				
Indiana (See Bay State)				
Iron Cliffs[6]				
Iron Mountain				
Jackson	1,005,937	132,297	119,910	130,131
Keystone (See East Champion)				
Lake[11]				
Lake Angeline	226,881	33,645	35,221	43,933
Lake Superior	932,792	158,047	185,070	158,078
Lillie				
Lloyd				
Lucy (McComber)	4,866	15,942	24,153	38,969
Maas				
Magnetic (Stock Pile)				
Manganese (Negaunee)				
Marquette[7]				
Mary Charlotte				
Mesabi's Friend				
Michigamme[4]			141	29,107

See foot notes 1, 2, 3, 4, 5, 6, 7 and 11 on page 136.

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.

1874.	1875.	1876.	1877.	1878.	1879.	1880.
.....	.....	.....	.....	.....	.....	794
41,403	43,209	37,632	37,909	26,680	24,015	24,522
.....	.....	8,583	.....	.....	3,336	2,268
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	6,478
7,549	.....	5,596	3,898	4,259	11,131	13,279
7,549	7,502	27,236	12,549	23,740	26,595	45,247
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
2,610	.....	6,329	10,083	3,754	6,724	6,958
47,097	56,877	66,002	70,883	73,464	94,027	112,401
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	949	2,415
105,858	129,881	146,393	152,188	152,737	131,167	212,748
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
35,088	8,059	.....	.....	.....	.....	6,663
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
5,227	3,346	7,715	14,495	5,401	4,029	10,217
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
4,719	847	125	.....	.....	4,804	1,122
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	[10]6,338	503	7,547	3,992	11,131
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
1,362	.....	.....	.....	1,225	492	285
27,890	9,642	3,333	16,545	23,921	18,204	14,726
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
105,600	90,568	98,480	80,340	83,121	103,219	120,620
.....	.....	.....	.....	.....	.....	.....
31,526	26,370	22,539	19,112	28,161	25,321	14,928
114,074	129,339	111,766	127,349	109,674	173,938	204,094
.....	.....	5,945	10,127	8,506	22,380	18,347
2,642	10,407	17,276	19,691	30,180	28,962	31,206
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
45,294	44,763	70,074	28,238	58,622	56,970	52,766

[10] Includes prior shipments.

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1870 and prior years.	1871.	1872.	1873.
Miller				
Milwaukee-Davis				
Mitchell				
Moore				
Morris				
National				
Negaunee				
Negaunee Construction Works				
New York (York)	309,207	76,381	68,950	70,882
New York Hematite	1,809	2,921	9,925	6,629
North Champion (See Hortense)				
North Republic				
Nonpareil (St. Lawrence)				
Northwest				
Norwood				
Ogden				
Pascoe				
Pendill				
Palmer				
Palmer (Cascade) (See Volunteer)				
Pioneer				
Pittsburg & Lake Angeline (See Lake Angeline)				
Platt				
Portland				
Primrose				
Prince of Wales[3]				
Quartz				
Queen[2]				
Queen Group[8]				
Republic			11,025	105,453
Republic Reduction Co				
Richards				
Richmond				
Riverside				
Rolling Mill		236	6,772	11,319
Saginaw			18,503	37,138
Salisbury[4]			545	11,023
Sam Mitchell (See Mitchell)				
Sampson (Argyle)	68,514	26,437	28,380	38,968
Schadt				
Section 12				
South Buffalo[2]				
Spurr				31,933
Star West (Wheat)				1,091
St. Lawrence (See Nonpareil)				
Sterling (See American)				
Taylor				
Teal Lake (See Cambria)				
Titan				
Volunteer (See Also Home)		4,171	39,495	28,920
Washington				
Webster				
West Republic				
Wetmore				
Wheeling				
Winthrop[9]				
Wheat (See Star West)				
Totals	3,735,210	779,607	879,724	1,148,921

See foot notes 2, 5, 8 and 9 on page 137.

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1874.	1875.	1876.	1877.	1878.	1879.	1880.
					941	13,142
				4,191	33,310	29,351
77,017	70,103	58,863	55,581	21,903	57,528	58,512
	987	556	3,307	4,547	2,609	2,192
				4,000	12,549	3,959
122,639	119,726	120,095	165,836	176,221	135,231	235,387
16,643	37,806	53,265	38,121	30,773	10,039	15,172
45,486	55,318	56,979	44,005	54,097	43,396	35,059
6,730	4,571	20,510	37,869	52,155	39,293	21,457
2,849	12,804	19,330	10,419	10,351	5,455	
					5,027	330
42,068	23,094	20,276	22,801	2,225	1,409	
2,139					851	3,323
						1,110
18,198	4,071	15,324	20,211	4,704	24,141	38,596
919,257	889,290	1,006,560	1,002,060	1,006,159	1,112,034	1,370,805

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1881.	1882.	1883.	1884.
American (Sterling)	4,702	8,006	3,618	2,916
Ames				
Barnum (Cliff Shaft)[1]	27,883	41,778	62,752	69,408
Bay State	583	1,236	631	
Bessemer (See Lillie)				
Bessie				
Beaufort (Ohio)		5,532	18,976	18,360
Blue (See Queen Group)				
Boston (with American)	14,824	18,245	20,190	2,218
Braastad { Mitchell	21,146	33,396		
Braastad { Winthrop	43,630	23,005	50,143	73,144
Breitung No. 1				
Breitung Hematite No. 2				
Buffalo[2]				
Cambria	19,246	64,545	47,508	59,742
Champion	145,427	159,009	104,960	210,180
Chester (See Rolling Mill)				
Chicago	5,531		117	
Cleveland[3]	198,569	206,120	218,219	
Cleveland Hematite (Included under Cleveland)				
Cleveland Cliffs Group[4]				225,674
Columbia (Kloman)	11,158	12,066	714	
Curry				
Dalliba (Phoenix)	10,986	44,836	1,687	
Detroit		5,402	12,314	3,809
Dexter			4,878	16,202
Dey				2,709
East Champion	3,408	4,002	5,039	
East New York				
Edison				
Edwards (See Sampson)				
Empire				
Erie		2,731	5,405	
Etna			1,091	
Fitch				
Foster[5]	3,011	11,648	10,029	9,675
Foxdale				
Gibson				
Goodrich	10,245	9,998		
Grand Rapids (Davis)				
Green Bay (See Bay State)				
Hartford				
Hortense (North Champion)				
Home (P. and L. S.) (Now Volunteer)				
Humboldt (Washington)	26,302	43,463	31,866	23,763
Imperial				
Indiana (See Bay State)				
Iron Cliffs[6]				
Iron Mountain				
Jackson	118,939	96,830	71,278	83,251
Keystone (See East Champion)				
Lake[11]				
Lake Angeline	18,060	14,326	27,259	86,922
Lake Superior	262,235	296,509	200,799	204,796
Lillie	16,748	27,494	4,614	2,683
Lloyd				
Lucy (McComber)	28,051	40,406	14,676	
Maas				
Magnetic (Stock Pile)				
Manganese (Negaunee)			397	1,484
Marquette[7]				
Mary Charlotte				
Mesabi's Friend				
Michigamme[8]	57,272	43,712	42,533	25,935

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1885.	1886.	1887.	1888.	1889.	1890.	1891.
.....	.....	1,483	13,699	20,032	21,000	21,604
47,458	52,975	16,123	10,211	12,835	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	847
17,166	17,354	12,829	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	7,017	16,419	4,091	.....	.....	.....
53,913	58,743	74,067	86,789	155,341	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	10,860	24,686	30,801	50,919	100,464	.....
50,796	58,784	41,130	57,861	72,780	80,359	34,662
173,915	137,593	146,330	174,680	215,098	223,442	133,413
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
218,757	203,664	207,441	184,316	274,048	331,713	221,788
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	16,671	.....	.....
.....	.....	1,605	.....	.....	.....	.....
19,125	39,400	26,099	18,500	10,112	6,080	.....
750	.....	.....	1,821	3,895	9,136	5,448
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	2,697	.....	.....
.....	.....	.....	13,694	29,739	36,431	50,293
.....	.....	.....	.....	893	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	16,550	15,093
9,643	.....	.....	.....	.....	21,949	.....
.....	.....	.....	.....	.....	.....	.....
1,515	12,142	2,700	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	1,200	11,611	20,058	26,426	9,362
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	566	.....	.....
.....	.....	886	5,685	7,757	16,246	.....
.....	.....	.....	.....	.....	.....	.....
11,766	20,207	19,873	11,655	15,866	23,259	19,879
.....	.....	.....	.....	.....	38,460	18,552
.....	.....	.....	.....	.....	.....	.....
.....	.....	87,346	78,520	134,616	188,776	278,270
.....	.....	393	.....	.....	.....	.....
68,657	89,370	109,906	101,909	128,891	124,682	92,979
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
111,051	131,731	191,120	223,600	229,070	261,680	241,605
.....	.....	.....	.....	.....	.....	.....
226,040	267,622	302,909	240,225	288,784	318,321	308,831
708	3,957	23,041	32,692	33,916	31,812	19,551
.....	.....	.....	.....	.....	.....	.....
.....	.....	12,139	22,276	32,982	43,483	27,683
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
3,111	1,367	.....	.....	.....	.....	.....
.....	5,229	20,441	7,000	70,128	23,692	16,802
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
12,373	48,790	58,726	36,448	56,999	80,777	23,169

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1881.	1882.	1883.	1884.
Miller				
Milwaukee-Davis	31,635	40,891	805	25,991
Mitchell				
Moore				
Morris				
National	24,833	23,366	21,178	13,987
Negaunee				
Negaunee Construction Works		1,177	10,394	43
New York (York)	50,074	56,806	1,517	1,677
New York Hematite		2,105		
North Champion (See Hortense)				
North Republic				
Nonpareil (St. Lawrence)		9,998	11,961	
Northwest				
Norwood				
Ogden				
Pascoe		18,880		12,605
Pendill	13,586	9,987	318	1,594
Palmer				
Palmer (Cascade) (See Volunteer)				
Pioneer				
Pittsburg & Lake Angeline (See Lake Angeline)				
Platt				
Portland				
Primrose				
Prince of Wales[2]				
Quartz				
Queen[3]				
Queen Group[4]				
Republic	233,786	235,109	152,565	277,757
Republic Reduction Co				
Richards				
Richmond				
Riverside				
Rolling Mill	1,668	163	1,528	1,820
Saginaw	30,793	16,276	9,108	946
Salisbury[5]	43,690	42,243	17,028	26,629
Sam Mitchell (See Mitchell)				
Sampson (Argyle)	4,584	12,421	15,700	1,334
Schadt				
Section 12	13,243	3,287		
South Buffalo[2]				
Spurr	2,746	8,873	9,067	
Star West (Wheat)	9,040	9,554	6,625	6,824
St. Lawrence (See Nonpareil)				
Sterling (See American)				
Taylor	10,559	15,146	6,155	
Teal Lake (See Cambria)				
Titan		1,778	13,128	19,411
Volunteer (See Also Home)	39,276	41,456	19,414	11,748
Washington				
Webster		4,443		934
West Republic	7,354	27,865	30,734	19,623
Wetmore		1,777	2,777	4,585
Wheeling				4,098
Winthrop[3]				
Wheat (See Star West)				
Totals	1,564,823	1,797,896	1,291,695	1,554,477

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1885.	1886.	1887.	1888.	1889.	1890.	1891.
38,465	46,693	50,490	48,908	52,727	24,763	
	8,823	8,411	546			
		5,259	45,304	78,318	76,488	64,218
	1,094					
		5,128		12,844	2,422	
			289			
		1,436				
		2,200	3,553			
18,249	10,072					
	5,140	1,203	9,066			
					32,415	
				491		
			5,527	66,122	109,217	
						479,509
250,835	241,161	220,624	235,062	287,390	220,065	191,127
		87	21,050	22,122	3,915	
		1,374				
			5,622	3,712		6,783
3,437	4,403	1,058	402			
						4,320
29,503	51,667	48,304	74,947	72,449	85,798	
	1,133		4,512	2,796	1,218	
		4,964	24,706	69,359	146,383	
	752					
9,200	15,867	17,538	4,987	7,997	15,141	4,412
23,340	13,865	16,003	2,846			
5,679	24,034	47,486	56,321	60,156	141,524	92,699
	6,229	2,054		448		
12,700	10,558	12,872	9,861	1,510		
5,887	10,756	3,335	2,074	19,679		
6,323		74			109,576	122,042
1,430,362	1,619,052	1,848,792	1,923,667	2,642,813	2,993,663	2,504,941

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1892.	1893.	1894.	1895.
American (Sterling)	15,076			
Ames		1,103	5,195	
Barnum (Cliff Shaft)[1]				
Bay State				
Bessemer (See Lillie)				
Bessie				
Beaufort (Ohio)				
Blue (See Queen Group)				
Boston (with American)				
Braastad { Mitchell				
Braastad { Winthrop				
Breitung No. 1				
Breitung Hematite No. 2				
Buffalo[2]				
Cambria	41,549	30,445	47,218	41,656
Champion	109,979	61,648	42,788	100,398
Chester (See Rolling Mill)				
Chicago				
Cleveland[3]				
Cleveland Hematite (Included under Cleveland)				
Cleveland Cliffs Group[4]	310,907	218,105	143,706	221,153
Columbia (Kloman)				
Curry				
Dalliba (Phoenix)				
Detroit				
Dexter	13,000	7,833	21,740	13,752
Dey				
East Champion				
East New York	35,175	911		
Edison				
Edwards (See Sampson)				
Empire				
Erie				
Etna				
Fitch				174
Foster[5]				
Foxdale				
Gibson				
Goodrich				
Grand Rapids (Davis)	22,823	352	12,073	6,764
Green Bay (See Bay State)				
Hartford	5,678	6,513	940	
Hortense (North Champion)				
Home (P. and L. S.) (Now Volunteer)				
Humboldt (Washington)	4,571			
Imperial	7,194			
Indiana (See Bay State)				
Iron Cliffs[6]	289,395	130,812	253,760	259,042
Iron Mountain				
Jackson	92,567	51,009	32,288	42,186
Keystone (See East Champion)				
Lake[11]				
Lake Angeline	287,517	351,973	355,453	313,555
Lake Superior	366,715	329,610	344,758	342,439
Lillie	29,005	68,861	78,388	54,285
Lloyd				
Lucy (McComber)	26,326	21,964		
Maas				
Magnetic (Stock Pile)				
Manganese (Negaunee)				
Marquette[7]	9,555			
Mary Charlotte				
Mesabi's Friend				5,503
Michigamme[8]	1,894	935	1,610	3,214

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1896.	1897.	1898.	1899.	1900.	1901.	1902.
						5,007
				1,583	4,338	59,781
587						
95,086	110,648	102,623	124,930	80,432	68,907	63,976
113,375	141,728	163,190	215,074	113,743	99,026	205,721
513,119	718,408	869,482	1,011,048	881,021	860,484	1,104,864
18,903	1,154					
				27,987	31,696	38,761
					4,647	15,015
67						
1,532						7,440
2,297						
			23,235	62,321		
80,710	79,102	55,012	88,230	31,714	38,271	15,449
342,251	489,685	460,333	464,988	389,128	481,574	304,125
459,576	376,761	686,563	682,595	709,143	635,642	832,796
107,532	112,781	211,023	196,200	114,990	98,788	79,919
	10,033	11,846				
10,540						

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1892.	1893.	1894.	1895.
Miller				
Milwaukee-Davis				
Mitchell				
Moore				
Morris				
National				
Negaunee	85,846	69,732	132,581	90,682
Negaunee Construction Works				
New York (York)	11,220	25,000	21,487	
New York Hematite				
North Champion (See Hortense)				
North Republic				
Nonpareil (St. Lawrence)				
Northwest	1,687			
Norwood				
Ogden				
Pascoe				
Pendill				
Palmer				
Palmer (Cascade) (See Volunteer)				
Pioneer				
Pittsburg & Lake Angeline (See Lake Angeline)				
Platt	2,676	5,448	41,226	13,198
Portland				
Primrose				
Prince of Wales[3]				
Quartz				
Queen[3]				
Queen Group[3]	379,719	120,673	252,469	204,957
Republic	167,991	64,195	105,719	174,027
Republic Reduction Co				
Richards				
Richmond				
Riverside		43		
Rolling Mill				
Saginaw				
Salisbury[3]				
Sam Mitchell (See Mitchell)				
Sampson (Argyle)	600			
Schadt				1,261
Section 12				
South Buffalo[3]				
Spurr				
Star West (Wheat)			5,550	51,207
St. Lawrence (See Nonpareil)				
Sterling (See American)				
Taylor				
Teal Lake (See Cambria)				
Titan				
Volunteer (See Also Home)	127,130	69,561	26,946	32,672
Washington				
Webster				
West Republic				
Wetmore				
Wheeling	191,658			
Winthrop[3]		180,071	134,365	119,120
Wheat (See Star West)				
Totals	2,637,453	1,816,797	2,060,260	2,091,245

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1896.	1897.	1898.	1899.	1900.	1901.	1902.
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	4,648	37,655	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
175,394	182,169	191,330	195,573	126,829	234,713	204,286
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	6,642	3,327	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	986	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
1,041	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
11,296	.....	.....	.....	.....	.....	.....
6,040	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
323,057	242,293	61,022	342,978	398,298	400,845	418,044
127,360	124,342	140,312	137,085	130,126	104,604	157,646
.....	.....	.....	.....	.....	.....	.....
.....	6,887	.....	.....	.....	.....	.....
1,088	4,630	24,464	4,613	51,303	54,181	50,041
.....	3,975	.....	.....	22,585	22,815	24,874
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
9,658	942	.....	6,716	15,987	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
53,216	1,617	.....	29,983	47,578	.....	32,736
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	20,797	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
150,496	106,894	122,592	171,318	148,945	109	129,496
.....	.....	.....	.....	.....	.....	.....
2,604,221	2,715,035	3,099,792	3,701,208	3,382,495	3,178,295	3,749,977

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued*

Name of Mine.	1903.	1904.	1905.	1906.
American (Sterling)				419
Ames				
Barnum (Cliff Shaft)[1]				
Bay State				
Bessemer (See Lillie)				
Bessie	29,718		21,879	1,646
Beaufort (Ohio)	134,648	25,781	38,306	
Blue (See Queen Group)				
Boston (with American)				
Braastad { Mitchell				
Braastad { Winthrop				
Breitung No. 1				
Breitung Hematite No. 2	7,854	9,869		83,671
Buffalo[2]				
Cambria	41,168	84,852	81,791	40,628
Champion	74,238	174	64,680	115,007
Chester (See Rolling Mill)				
Chicago				
Cleveland[3]				
Cleveland Hematite (Included under Cleveland)				
Cleveland Cliffs Group[4]	810,845	743,263	1,288,416	1,330,944
Columbia (Kloman)				
Curry				
Dalliba (Phoenix)				
Detroit				
Dexter				
Dey				
East Champion				
East New York	22,523	7,299	33,095	
Edison				
Edwards (See Sampson)				
Empire				
Erie				
Etna				
Fitch				
Foster[5]				
Foxdale	5,053	3,429	3,303	
Gibson				
Goodrich				
Grand Rapids (Davis)				
Green Bay (See Bay State)				
Hartford	20,085	179,980	322,209	364,801
Hortense (North Champion)				
Home (P. and L. S.) (Now Volunteer)				
Humboldt (Washington)				
Imperial		727	1,661	5,076
Indiana (See Bay State)				
Iron Cliffs[6]				
Iron Mountain				
Jackson	5,409		33,180	5,066
Keystone (See East Champion)				
Lake[11]				
Lake Angeline	310,950	262,486	374,183	269,116
Lake Superior	604,829	590,339	727,378	635,671
Lillie	77,454	63,209	9,868	32,781
Lloyd				
Lucy (McComber)				85
Maas				
Magnetic (Stock Pile)				292
Manganese (Negaunee)				
Marquette[7]				
Mary Charlotte	34,303	48,885	221,738	257,088
Mesabi's Friend				
Michigamme[8]				

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

1907.	1908.	1909.	1910.	1911.	1912.	Totals.
13,764	23,222	90,001	163,290	195,197	122,211	721,034
.....	.....	.....	.....	.....	.....	6,298
.....	.....	.....	.....	.....	.....	801,851
.....	.....	.....	.....	.....	.....	16,637
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	59,097
78,029	61,035	72,987	23,427	2,683	.....	592,815
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	62,542
.....	.....	.....	.....	.....	.....	136,636
.....	.....	.....	.....	.....	.....	831,445
.....	.....	.....	.....	63,497	57,085	120,582
59,667	55,849	129,673	114,202	72,688	63,995	597,468
.....	.....	.....	.....	.....	.....	217,730
135,145	85,977	136,815	150,422	85,954	69,904	2,343,997
107,577	313	11,199	18,746	.....	.....	4,413,131
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	9,012
.....	.....	.....	.....	.....	.....	2,806,298
1,030,928	438,379	877,433	955,374	514,305	1,032,836	17,742,421
.....	.....	.....	.....	.....	.....	94,813
.....	.....	.....	.....	.....	.....	16,671
.....	.....	.....	.....	.....	.....	59,114
.....	.....	.....	.....	.....	.....	140,841
.....	.....	.....	.....	.....	.....	118,512
.....	.....	.....	.....	.....	.....	2,709
.....	.....	.....	.....	.....	.....	76,002
.....	.....	.....	.....	.....	.....	327,604
.....	.....	.....	.....	.....	.....	893
40,565	53,537	108,993	53,687	16,954	33,124	306,860
.....	.....	.....	.....	.....	.....	8,136
.....	.....	.....	.....	.....	.....	1,091
.....	.....	.....	.....	.....	.....	31,817
.....	.....	.....	.....	.....	.....	171,893
.....	.....	.....	.....	.....	.....	31,447
.....	.....	.....	.....	.....	.....	16,357
.....	.....	.....	.....	.....	.....	49,754
.....	.....	.....	.....	.....	.....	110,736
328,161	278,366	250,680	183,471	.....	.....	1,950,422
.....	.....	.....	.....	.....	.....	30,574
.....	.....	.....	.....	.....	.....	26,022
.....	.....	.....	.....	.....	.....	713,961
55,756	48,231	115,478	83,404	86,959	53,943	600,997
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	1,700,537
.....	.....	.....	.....	.....	.....	393
61,345	.....	11,060	40,320	22,303	53,559	3,995,695
.....	.....	.....	.....	.....	.....	.....
283,373	220,410	280,298	244,923	167,258	151,910	8,849,550
674,066	261,955	349,435	271,445	167,352	169,326	15,539,686
80,545	8,632	61,708	10,121	25,597	26,119	1,810,327
.....	.....	.....	.....	28,003	44,224	72,227
.....	1,115	1,672	11,257	16,676	72,724	619,688
32,378	29,036	159,197	208,103	24,926	46,664	500,304
.....	.....	.....	.....	.....	.....	292
.....	.....	.....	.....	.....	.....	6,359
.....	.....	.....	.....	.....	.....	152,847
155,633	99,104	240,433	197,522	340,335	250,700	1,845,741
.....	.....	.....	.....	.....	.....	16,043
.....	.....	.....	.....	.....	.....	880,362

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Continued.*

Name of Mine.	1903.	1904.	1905.	1906.
Miller				
Milwaukee-Davis				
Mitchell				
Moore		25,828		
Morris				
National				
Negaunee	224,665	145,132	239,554	253,448
Negaunee Construction Works				
New York (York)				
New York Hematite				
North Champion (See Hortense)				
North Republic				
Nonpareil (St. Lawrence)				
Northwest				
Norwood				
Ogden				
Pascoe				
Pendill				
Palmer				13,131
Palmer (Cascade) (See Volunteer)				
Pioneer				
Pittsburg & Lake Angeline (See Lake Angeline)				
Platt				
Portland				
Primrose				
Prince of Wales[3]				
Quartz				
Queen[2]				
Queen Group[6]	254,658	311,479	253,377	221,096
Republic	155,415	124,506	150,699	177,220
Republic Reduction Co				
Richards				
Richmond	55,593	68,134	86,129	89,563
Riverside				
Rolling Mill	6,786		28,766	
Saginaw				
Salisbury[4]				
Sam Mitchell (See Mitchell)				
Sampson (Argyle)				
Schadt				
Section 12				
South Buffalo[2]				
Spurr				
Star West (Wheat)				
St. Lawrence (See Nonpareil)				
Sterling (See American)				
Taylor				
Teal Lake (See Cambria)				
Titan				
Volunteer (See Also Home)	7,395	71,870	106,281	38,544
Washington				
Webster				
West Republic				
Wetmore				
Wheeling				
Winthrop[5]	72,433			
Wheat (See Star West)				
Totals	2,956,022	2,767,242	4,086,493	3,935,293

[1]Under Iron Cliffs 1890-1895; under Cleveland-Cliffs group after 1895.
[2]Under Queen group after 1890.
[3]Under Cleveland-Cliffs group after 1883.
[4]Includes Cleveland after 1883; includes Barnum, Foster, Iron Cliffs, Michigamme and Salisbury after 1895.
[5]Under Iron Cliffs 1891-1895; under Cleveland-Cliffs group after 1895.

IRON ORE SHIPMENTS FROM THE MARQUETTE RANGE.—*Concluded.*

1907.	1908.	1909.	1910.	1911.	1912.	Totals.
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	7,781	11,536	394,768
.....	11,539	.....	23,428	21,387	21,141	95,275
.....	.....	.....	.....	.....	.....	68,131
.....	.....	.....	.....	.....	1,529	1,529
.....	.....	.....	.....	.....	.....	150,216
196,170	232,219	312,217	348,818	140,040	442,190	4,493,175
.....	.....	.....	.....	.....	.....	12,708
.....	.....	.....	.....	.....	.....	1,123,071
.....	.....	.....	.....	.....	.....	37,587
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	289
.....	.....	.....	.....	.....	.....	23,395
.....	.....	.....	.....	.....	.....	1,687
.....	.....	.....	.....	.....	.....	5,753
.....	.....	.....	.....	.....	.....	986
.....	.....	.....	.....	.....	.....	59,806
.....	.....	.....	.....	.....	.....	45,993
.....	.....	.....	.....	.....	.....	14,172
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	15,409
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	73,844
.....	.....	79,652	49,584	.....	.....	129,236
.....	.....	.....	.....	.....	.....	6,040
.....	.....	.....	.....	.....	.....	32,415
.....	.....	.....	.....	.....	.....	491
.....	.....	.....	.....	.....	.....	180,866
309,917	104,098	237,509	230,119	295,062	224,862	6,066,941
170,554	67,999	176,575	150,732	113,137	156,867	6,614,205
.....	.....	.....	.....	.....	.....	47,174
.....	.....	.....	.....	.....	.....	8,261
35,156	60,994	102,566	95,772	47,293	117,873	949,393
.....	.....	.....	.....	.....	.....	16,160
49,204	52,147	133,139	115,193	96,584	115,784	906,477
.....	.....	.....	.....	.....	.....	451,424
.....	.....	.....	.....	.....	.....	686,411
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	267,805
.....	.....	.....	.....	.....	.....	1,261
.....	.....	.....	.....	.....	.....	21,887
.....	.....	.....	.....	.....	.....	245,412
.....	.....	.....	.....	.....	.....	165,244
.....	.....	.....	.....	.....	.....	204,649
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	32,970
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	90,371
10,022	.....	.....	.....	51,240	9,008	1,453,423
.....	20,625	44,716	96,769	62,010	66,540	290,660
.....	.....	.....	.....	.....	.....	34,905
.....	.....	.....	.....	.....	.....	133,077
.....	.....	.....	.....	.....	.....	50,870
.....	.....	.....	.....	.....	.....	433,771
.....	.....	.....	.....	.....	.....	1,335,839
.....	.....	.....	.....	.....	.....	.....
3,907,955	2,214,782	3,983,436	3,840,129	2,666,121	3,415,654	99,831,703

[6]Under Cleveland-Cliffs group after 1895.
[7]Under Winthrop after 1892.
[8]Includes Buffalo, Prince of Wales, Queen and South Buffalo after 1890.
[9]Prior to 1890, see Braastad; includes Marquette after 1892.
[11]Included in Cleveland Cliffs Group.

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.[1]

	1884.	1885.	1886.	1887.	1888.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	.....	.....	.....	10,075	24,676
Ashland	.....	6,741	74,015	175,563	174,183
Aurora	.....	5,422	94,553	159,253	179,937
Bessemer	.....	.....	4,788	16,101	.....
Blue Jacket	.....	.....	.....	1,799	.....
Brotherton	.....	.....	8,880	21,721	40,639
Castile	.....	.....	.....	.....	.....
Chicago	.....	.....	.....	.....	.....
Colby	1,022	84,303	257,432	258,518	285,880
Davis (Wisconsin)	.....	.....	.....	.....	.....
Eureka	.....	.....	.....	.....	.....
Federal	.....	.....	.....	.....	.....
First National	.....	.....	.....	1,997	.....
Geneva	.....	.....	.....	.....	.....
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	9,950	2,249	.....
Iron Chief No. 2	.....	.....	551	.....	.....
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	.....	.....	18,424	24,762	.....
Jack Pot	.....	.....	.....	.....	.....
Meteor (Comet)	.....	.....	.....	.....	.....
Mikado	.....	.....	.....	.....	.....
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport	.....	.....	20,184	75,660	69,145
Norrie Group	.....	15,419	124,844	237,254	412,196
Pabst	.....	1,103	17,979	19,906	49,976
Palms	.....	.....	.....	1,414	9,725
Pike	.....	.....	.....	.....	.....
Puritan (Ruby)	.....	.....	16,388	45,000	3,058
Sparta	.....	.....	.....	.....	.....
Sunday Lake	.....	1,405	10,963	18,137	.....
Tilden	.....	.....	.....	.....	.....
Vaughn (see Aurora)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	.....	.....	.....	.....	.....
Total	1,022	114,393	658,951	1,069,409	1,249,415

[1]From Iron Trade Review.

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.

(Continued.)

	1889.	1890.	1891.	1892.	1893.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	47,000	73	42,090	.....	.....
Ashland	257,915	435,949	267,439	231,896	66,067
Aurora	199,865	246,695	83,554	319,482	179,028
Bessemer	.....	.....	.....	.....	.....
Blue Jacket	.....	.....	.....	.....	.....
Brotherton	53,267	80,486	46,574	130,833	18,905
Castile	.....	.....	.....	.....	.....
Chicago	.....	.....	.....	.....	.....
Colby	136,833	193,038	9,619	69,968	59,346
Davis (Wisconsin)	.....	1,497	.....	21,754	15,210
Eureka	.....	23,794	13,907	10,655	31,385
Federal	.....	21,150	6,778	8,515	.....
First National	.....	.....	.....	.....	.....
Geneva	.....	.....	.....	.....	.....
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	.....	.....	.....
Iron Chief No. 2	.....	.....	.....	.....	.....
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	8,635	6,247	300	.....	.....
Jack Pot	.....	.....	.....	3,944	1,651
Meteor (Comet)	.....	2,882	10,144	54,779	9,604
Mikado	.....	.....	.....	.....	.....
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport	36,987	71,488	105,606	165,962	109,718
Norrie Group	674,394	906,728	758,572	985,216	472,062
Pabst	116,376	172,060	130,226	113,245	104,510
Palms	35,245	50,604	32,227	102,382	2,658
Pike	.....	.....	.....	.....	.....
Puritan (Ruby)	9,472	11,694	913	.....	.....
Sparta	.....	.....	.....	2,912	.....
Sunday Lake	.....	6,010	64,902	56,046	22,876
Tilden	.....	.....	28,415	233,356	135,118
Vaughn (see Aurora)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	.....	.....	.....	.....	.....
Total	1,575,989	2,230,395	1,601,266	2,510,945	1,228,138

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.

(Continued.)

	1894.	1895.	1896.	1897.	1898.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	13,297	68,064	57,483	.....	5,037
Ashland	83,020	126,096	91,149	111,625	123,208
Aurora	203,152	245,883	187,169	166,122	133,076
Bessemer	.....	.....	.....	.....	.....
Blue Jacket	.....	.....	.....	.....	.....
Brotherton	47,148	40,567	50,490	46,186	73,198
Castile	.....	.....	.....	.....	.....
Chicago	.....	.....	504	.....	.....
Colby	32,616	.....	48,492	22,921	152,875
Davis (Wisconsin)	.....	10,253	.....	.....	.....
Eureka	18,329	26,105	4,544	.....	.....
Federal	.....	.....	.....	.....	.....
First National	.....	.....	.....	.....	.....
Geneva	.....	.....	.....	.....	.....
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	.....	.....	.....
Iron Chief No. 2	.....	.....	.....	.....	.....
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	.....	.....	.....	.....	.....
Jack Pot	.....	.....	.....	1,265	.....
Meteor (Comet)	11,782	.....	.....	.....	.....
Mikado	.....	4,788	.....	11,397	.....
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport	150,392	157,821	142,369	150,979	196,953
Norrie Group	621,608	738,480	329,068	604,281	700,990
Pabst	206,074	219,960	68,984	220,496	223,891
Palms	37,911	46,965	114,108	207,153	175,925
Pike	.....	.....	.....	.....	.....
Puritan (Ruby)	.....	.....	.....	.....	.....
Sparta	.....	1,950	.....	.....	.....
Sunday Lake	34,323	20,970	89,441	45,815	.....
Tilden	209,077	418,188	250,205	276,890	287,203
Vaughn (see Aurora)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	.....	.....	.....	.....	.....
Total	1,668,729	2,126,090	1,434,006	1,865,130	2,072,356

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.

(Continued.)

	1899.	1900.	1901.	1902.	1903.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	.....	.....	1,101	135,502	11,309
Ashland	154,615	232,961	286,399	301,824	274,138
Aurora	170,369	193,111	223,747	402,981	355,365
Bessemer	.....	.....	.....	.....	.....
Blue Jacket	.....	.....	.....	.....	.....
Brotherton	78,858	89,804	103,109	53,255	94,986
Castile	.....	.....	.....	.....	.....
Chicago	.....	633	.....	44,625	22,965
Colby	103,239	32,572	23,475	22,526	54,915
Davis (Wisconsin)	5,029	3,569	.....	31,530	734
Eureka	.....	.....	.....	.....	.....
Federal	.....	.....	.....	.....	.....
First National	.....	.....	.....	.....	.....
Geneva	.....	.....	.....	.....	7,108
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	.....	.....	.....
Iron Chief No. 2	.....	.....	.....	.....	.....
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	7,977	25,047	.....	8,555	16,875
Jack Pot	.....	33,893	19,988	102	31,709
Meteor (Comet)	332	7,844	34,140	19,117	6,156
Mikado	10,324	1,090	91,846	98,834	108,709
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport	263,711	217,201	190,448	141,571	279,905
Norrie Group	714,669	666,389	660,965	1,080,032	790,346
Pabst	263,869	239,242	198,686	.....	.....
Palms	154,705	139,658	7,603	32,113	60,800
Pike	.....	3,434	6,346	6,343	115
Puritan (Ruby)	.....	.....	21,788	.....	.....
Sparta	.....	.....	.....	.....	.....
Sunday Lake	12,526	74,097	89,997	144,630	91,383
Tilden	500,830	481,909	446,670	468,672	211,534
Vaughn (see Aurora)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	.....	.....	12,836	26,043	46,211
Total	2,441,053	2,442,454	2,419,144	3,018,255	2,465,263

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.

(*Continued.*)

	1904.	1905.	1906.	1907.	1908.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	45,595	82,118	79,493	39,495	35,937
Ashland	344,102	409,131	341,841	298,056	259,611
Aurora	212,920	.....	.....	.....	.....
Bessemer	.....	.....	.....	.....	.....
Blue Jacket	.....	.....	.....	.....	.....
Brotherton	84,870	137,351	147,281	104,224	96,776
Castile	.....	.....	2,108	6,157	.....
Chicago	.....	.....	.....	.....	.....
Colby	81,141	83,736	113,001	94,480	58,305
Davis (Wisconsin)	11,225	3,160	.....	.....	.....
Eureka	.....	.....	37,525	57,904	122,324
Federal	.....	.....	.....	.....	.....
First National	.....	.....	.....	.....	.....
Geneva	.....	.....	.....	.....	.....
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	.....	.....	.....
Iron Chief No. 2	.....	.....	.....	.....	.....
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	23,197	41,314	106,158	190,968	92,932
Jack Pot	6,538	.....	.....	.....	.....
Meteor (Comet)	59,589	.....	.....	.....	.....
Mikado	25,611	140,740	154,043	163,891	86,617
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport	171,931	438,023	549,745	551,496	579,390
Norrie Group	618,638	1,527,128	1,245,997	1,109,085	773,243
Pabst	.....	.....	.....	.....	.....
Palms	53,718	13,953	5,622	.....	.....
Pike	.....	11,161	17,934	24,922	6,303
Puritan (Ruby)	1,259	.....	.....	.....	.....
Sparta	.....	.....	.....	.....	.....
Sunday Lake	50,625	79,209	86,879	101,899	111,130
Tilden	204,581	188,104	169,697	312,496	111,184
Vaughn (see Aurora)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	46,860	60,224	56,657	38,010	14,874
Total	2,042,398	3,215,352	3,113,981	3,093,083	2,348,626

IRON ORE SHIPMENTS FROM THE GOGEBIC RANGE, MICHIGAN.

(Concluded.)

	1909.	1910.	1911.	1912.	Total.
Ada (included in Ironton)	.....	.....	.....	.....	.....
Anvil	22,927	7,235	310	55,610	784,427
Ashland	259,612	231,506	151,478	211,927	5,982,067
Asteroid	.....	.....	20,569	70,239	90,808
Aurora (Norrie-Aurora Group after 1910)	.....	.....	.....	.....	3,961,684
Bessemer	.....	.....	.....	.....	20,889
Blue Jacket	.....	.....	.....	.....	1,799
Brotherton	103,090	102,626	65,015	148,930	2,069,069
Castile	26,982	20,197	23,597	136,703	215,744
Chicago	.....	.....	.....	.....	68,727
Colby	170,095	194,754	41,673	245,195	2,931,970
Davis (Wisconsin)	.....	.....	.....	.....	103,961
Eureka	115,662	41,611	98,609	65,723	668,077
Federal	.....	.....	.....	.....	36,443
First National	.....	.....	.....	.....	1,997
Geneva	.....	.....	.....	.....	7,108
Imperial (see Federal)	.....	.....	.....	.....	.....
Iron Chief	.....	.....	.....	.....	12,199
Iron Chief No. 2	.....	.....	.....	.....	551
Iron King (see Newport)	.....	.....	.....	.....	.....
Ironton	277,594	109,025	63,359	173,135	1,195,404
Jack Pot	.....	.....	.....	.....	99,090
Meteor (Comet)	.....	.....	.....	.....	216,367
Mikado	99,195	52,715	.....	.....	1,049,800
New Davis (see Davis)	.....	.....	.....	.....	.....
Newport and Bonnie	1,008,354	1,182,324	555,853	966,435	8,549,651
Norrie-Aurora Group (after 1910)	977,054	1,333,006	883,910	1,500,758	21,462,332
Pabst (Norrie-Aurora Group)	.....	.....	.....	.....	2,366,583
Palms	.....	.....	.....	39,152	1,323,641
Pike	22,174	3,324	.....	.....	102,056
Puritan (Ruby)	.....	50,019	.....	90,683	250,274
Sparta	.....	.....	.....	.....	4,862
Sunday Lake	93,712	115,486	56,096	155,485	1,634,042
Tilden	154,506	99,937	138,387	158,191	5,485,150
Vaughn (see Aurora) (Norrie-Aurora Group after 1910)	.....	.....	.....	.....	.....
Wisconsin (see Davis)	.....	.....	.....	.....	.....
Yale (West Colby)	71,458	108,253	154,944	76,772	713,142
Total	3,402,415	3,652,918	2,253,800	4,094,938	61,409,914

IRON ORE SHIPMENTS FROM THE IRON RIVER DISTRICT, MICHIGAN.[1]

	1882.	1883.	1884.	1885.	1886.
Baker					
Baltic					
Berkshire					
Beta					1,585
Caspian					
Chatham					
Davidson No. 1					
Davidson No. 2					
Chicagon					
Fogarty					
Hiawatha					
Iron River	29,115	100,369	52,584	55,693	78,591
James (Osana)					
Dober					
Nanaimo	2,480	29,221	37,620		5,400
Riverton					
Selden					790
Sheridan					
Tully					
Youngs					
Zimmerman					
Total	31,595	129,590	90,204	55,693	86,366

	1887.	1888.	1889.	1890.	1891.
Baker					
Baltic					
Berkshire					
Beta	1,226				1,400
Caspian					
Chatham					
Davidson No. 1					
Davidson No. 2					
Chicagon					
Fogarty					
Hiawatha					
Iron River	83,018	110,000	179,238	155,458	59,345
James (Osana)					
Dober					
Nanaimo	30,460	5,744		3,441	13,200
Riverton					
Selden	1,302				
Sheridan			1,102	595	7,137
Tully					
Youngs					
Zimmerman					
Total	116,006	115,744	180,340	159,494	81,082

[1]From Iron Trade Review.

IRON ORE SHIPMENTS FROM THE IRON RIVER DISTRICT, MICHIGAN.

(*Continued.*)

	1892.	1893.	1894.	1895.	1896.
Baker					
Baltic					
Berkshire					
Beta					
Caspian					
Chatham					
Davidson No. 1					
Davidson No. 2					
Chicagon					
Fogarty					
Hiawatha		1,683		1,201	
Iron River	1,176				
James (Osana)					
Dober					
Nanaimo					
Riverton					
Selden					
Sheridan	45,744	2,234		16,754	3,419
Tully					
Youngs					
Zimmerman					
Total	46,921	3,917		17,955	3,419

	1897.	1898.	1899.	1900.	1901.
Baker					
Baltic					17,326
Berkshire					
Beta					
Caspian					
Chatham					
Davidson No. 1					
Davidson No. 2					
Chicagon					
Fogarty					
Hiawatha				11,008	20,355
Iron River					
James (Osana)					
Dober		5,009	10,980	49,203	
Nanaimo					
Riverton			2,262	71,004	119,860
Selden					
Sheridan	146		31,104	8,063	
Tully					
Youngs					
Zimmerman					
Total	146	5,009	44,346	139,278	157,541

IRON ORE SHIPMENTS FROM THE IRON RIVER DISTRICT, MICHIGAN.

(*Concluded*)

	1902.	1903.	1904.	1905.	1906.
Baker					
Baltic	64,664	123,236	151,114	133,246	186,495
Berkshire					
Beta					
Caspian		2,088	4,242	10,248	80,875
Chatham					
Davidson No. 1					
Davidson No. 2					
Chicagon					
Fogarty					
Hiawatha	74,596	53,828	38,288	9,704	20
Iron River					
James (Osana)					
Dober					
Nanaimo			9,086	91,238	91,792
Riverton	215,850	97,633	81,543	82,611	161,704
Selden					
Sheridan					
Tully					
Youngs				10,926	47,583
Zimmerman					
Total	355,110	276,785	284,273	337,973	568,469

	1907.	1908.	1909.	1910.	1911.	1912.	Total.
Baker			45,003	39,417	3,290		87,710
Baltic	189,119	129,037	174,426	171,930	66,502	100,736	1,507,831
Berkshire		3,440	34,295	97,999	22,272	33,422	191,428
Beta							4,211
Caspian	138,867	102,628	189,023	171,334	165,660	306,914	1,171,879
Cortland						17,499	17,499
Chatham	14,883	45,826	68,730	51,988	58,054	135,298	374,779
Davidson No. 1					215	27,614	27,829
Davidson No. 2					45,219	98,760	143,979
Chicagon					108,947	149,619	258,566
Fogarty	7,949	32,560	77,356	51,071	67,616	84,074	320,626
Hiawatha		138,190	136,739	128,884	116,633	220,106	951,235
Iron River							904,587
James (Osana)	2,360	59,760	90,851	78,388	50,439	75,702	357,500
Dober							65,192
Nanaimo	53,778	305					373,765
Riverton	90,358	47,073	171,200	84,269	200,142	171,493	1,597,002
Selden							2,092
Sheridan							116,299
Tully				2,726	8,323		11,049
Virgil						3,750	3,750
Wauseca					749		749
Wickwire					1,919	40,417	42,336
Youngs	92,632	70,094	154,150	98,399	89,450	83,528	646,762
Zimmerman		1,832	10,303	25,555	110,084	187,584	335,358
Total	589,946	630,745	1,152,076	1,001,960	1,115,514	1,736,516	9,514,013

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.[1]

	1882.	1883.	1884.	1885.	1886.
Alpha	.....	.....	.....	.....	.....
Armenia	.....	.....	.....	.....	50,275
Bristol (Claire)	.....	.....	.....	.....	.....
Columbia	15,948	4,334	6,774	.....	14,282
Crystal Falls	1,341	.....	.....	.....	.....
Delphic	.....	3,410	508	9,880	17,648
Dunn	.....	.....	.....	.....	.....
Fairbanks	8,045	455	.....	.....	.....
Genesee (Ethel)	.....	.....	.....	.....	.....
Gibson	.....	.....	.....	.....	.....
Great Western	587	22,825	20,710	.....	22,267
Hemlock	.....	.....	.....	.....	.....
Hilltop	.....	.....	.....	.....	.....
Hollister	.....	.....	.....	.....	.....
Hope	.....	.....	.....	.....	.....
Kimball	.....	.....	.....	.....	.....
Lamont (Monitor)	.....	.....	.....	.....	.....
Lee Peck	.....	.....	.....	.....	.....
Lincoln	.....	.....	.....	.....	.....
Manganate	.....	.....	.....	.....	.....
Mansfield	.....	.....	.....	.....	.....
Mastodon	3,477	18,577	18,187	11,737	41,640
McDonald	.....	.....	.....	.....	.....
Michigan	.....	.....	.....	.....	.....
Monongahela	.....	.....	.....	.....	.....
Paint River (Fairbanks)	6,515	5,973	11,652	2,373	13,933
Shelden & Shafer (Union) (see Columbia)	.....	.....	.....	.....	.....
South Mastodon	.....	.....	.....	.....	.....
Tobin	.....	.....	.....	.....	.....
Youngstown	6,198	15,292	8,344	.....	25,635
Total	42,111	70,866	66,175	23,990	185,680

[1]From Iron Trade Review.

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.

(Continued.)

	1887.	1888.	1889.	1890.	1891.
Alpha					
Armenia	26,649				
Bristol (Claire)					
Columbia	2,377	10,936	11,385	60,133	70,770
Crystal Falls				3,974	
Delphic	2,272				
Dunn	24,677	118,096	151,826	156,963	162,721
Fairbanks					
Genesee (Ethel)					
Gibson					
Great Western	23,239	21,860	38,454	72,546	62,464
Hemlock					35,531
Hilltop					
Hollister				2,020	1,057
Hope					
Kimball					
Lamont (Monitor)			12,348	31,139	26,226
Lee Peck					
Lincoln					1,813
Manganate				6,844	
Mansfield				18,303	49,836
Mastodon	48,792	51,463	63,511	66,526	45,370
McDonald					
Michigan					
Monongahela					
Paint River (Fairbanks)	10,240	12,506	32,700	62,654	45,435
Shelden & Shafer (Union) (see Columbia)					
South Mastodon		2,722	4,005	1,476	
Tobin					
Youngstown	34,418	12,699		44,460	3,705
Total	172,665	230,282	314,229	527,038	504,928

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.

(Continued.)

	1892.	1893.	1894.	1895.	1896.
Alpha					
Armenia				2,045	
Bristol (Claire)	57,352	9,612			
Columbia	57,682	22,426	10,300	70,867	87,202
Crystal Falls				13,037	44,526
Delphic					52
Dunn	133,666	58,590	24,538	90,885	47,081
Fairbanks					
Genesee (Ethel)					
Gibson	16,357				
Great Western	87,487	661			14,643
Hemlock	65,459	11,323		949	94,645
Hilltop					
Hollister	1,021				
Hope	15,543	2,275			
Kimball					
Lamont (Monitor)	42,819	13,777	2,600		
Lee Peck	2,844				
Lincoln	26,019	8,757			
Manganate					
Mansfield	69,259	69,558			
Mastodon	9,150	23,485		23,733	60
McDonald					
Michigan		505	77	1,071	
Monongahela					
Paint River (Fairbanks)	18,390				
Shelden & Shafer (Union) (see Columbia)					
South Mastodon					
Tobin					
Youngstown				13	
Total	603,048	220,969	37,515	202,600	288,209

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.

(*Continued.*)

	1897.	1898.	1899.	1900.	1901.
Alpha					
Armenia					18,750
Bristol (Claire)			80,915	51,639	36,593
Columbia	24,623	14,199	126,290	97,531	19,963
Crystal Falls	95,210	128,233	147,346	197,770	230,614
Delphic					
Dunn	31,062	49,381	7,458		
Fairbanks					
Genesee (Ethel)					
Gibson					
Great Western		33,851	43,316	98,550	123,261
Hemlock	96,032	69,865	110,269	72,413	149,966
Hilltop			3,496	6,410	2,503
Hollister					
Hope					
Kimball					
Lamont (Monitor)			67,652	31,323	
Lee Peck					
Lincoln			43,622	72,959	19,727
Manganate					
Mansfield	37,182	60,739	86,607	90,155	74,113
Mastodon					
McDonald					
Michigan	216				
Monongahela					2,397
Paint River (Fairbanks)				1,316	
Shelden & Shafer (Union) (see Columbia)					
South Mastodon					
Tobin					18,957
Youngstown	661				
Total	284,986	356,268	716,971	720,066	696,841

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.

(*Continued.*)

	1902.	1903.	1904.	1905.	1906.
Alpha	.....	1,370	.....	.....	.....
Armenia	100,864	31,901	16,577	.....	27,882
Bristol (Claire)	129,035	246,581	132,420	210,388	298,031
Columbia	186,798	.....	.....	27,883	.....
Crystal Falls	195,555	117,096	180,983	152,255	111,871
Delphic	.....	.....	.....	.....	.....
Dunn	2,816	5,365	.....	21,051	91,476
Fairbanks	.....	.....	.....	.....	.....
Genesee (Ethel)	14,455	61,694	132,380	77,370	80,971
Gibson	.....	.....	.....	.....	.....
Great Western	42,470	100,751	68,318	191,265	311,218
Hemlock	123,331	79,420	136,232	124,450	106,437
Hilltop	.....	.....	.....	.....	7,820
Hollister	.....	.....	.....	.....	.....
Hope	3,373	7,339	.....	.....	.....
Kimball	.....	.....	.....	.....	.....
Lamont (Monitor)	47,267	43,736	29,393	74,991	89,980
Lee Peck	.....	.....	.....	.....	.....
Lincoln	7,747	15,606	17,577	19,539	5,890
Manganate	.....	.....	.....	.....	.....
Mansfield	31,181	51,440	79,163	38,584	.....
Mastodon	.....	.....	.....	.....	.....
McDonald	.....	.....	.....	.....	.....
Michigan	53,272	.....	.....	58,088	146
Monongahela	.....	6,913	.....	.....	.....
Paint River (Fairbanks)	10,383	9,863	11,257	11,973	28,321
Shelden & Shafer (Union) (see Columbia)	.....	.....	.....	.....	.....
South Mastodon	.....	.....	.....	.....	.....
Tobin	55,238	45,386	113,669	166,529	235,867
Youngstown	.....	.....	.....	.....	.....
Total	1,003,785	824,461	917,969	1,174,366	1,395,910

IRON ORE SHIPMENTS FROM THE CRYSTAL FALLS DISTRICT, MICHIGAN.

(*Concluded.*)

	1907.	1908.	1909.	1910.	1911.	1912.	Total.
Alpha							1,370
Armenia	36,665			65,473	51,862	150,808	579,751
Bristol (Claire)	345,676	190,300	396,825	270,742	322,729	438,900	3,217,738
Columbia							942,703
Crystal Falls	114,158	296	986				1,735,251
Delphic							33,770
Dunn	141,992	8,829	193,396	136,144	232,092	242,304	2,132,411
Fairbanks							8,500
Genesee (Ethel)	38,984		65,585	66,185	25,342	4,248	567,214
Gibson		4,548	36,246	45,202	56,528		158,881
Great Western	234,492	124,246	112,747	80,709	84,338	3,342	2,040,617
Hemlock	117,181	83,834	112,481	115,407	107,753	126,132	1,939,110
Hilltop							20,229
Hollister	6,371	10,671	25,842	49,434	5,022		101,438
Hope							28,530
Kimball	16,224						16,224
Lamont (Monitor)	42,090			3,183			558,524
Lee Peck							2,844
Lincoln	714		1,657				241,627
Manganate							6,844
Mansfield	183,532	44,633	118,713	114,357	54,646		1,272,001
Mastodon							425,708
McDonald			1,114	6,022	5,240	1,384	13,760
Michigan	39,819	603		17,922			171,719
Monongahela							9,310
Paint River (Fairbanks)	75,805						371,289
Ravenna					127	18,303	18,430
Shelden & Shafer (Union) (see Columbia)							
South Mastodon							8,203
Tobin	237,781	161,642	359,668	235,812	308,456	319,318	2,258,323
Youngstown							151,425
Total	1,631,484	629,602	1,425,261	1,206,592	1,254,135	1,304,739	19,033,774

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.[1]

	1877.	1878.	1879.	1880.	1881.
Antoine					
Aragon					
Breen	5,812	4,796	1,463	5,359	
Briar Hill					
Chapin				34,556	134,521
Clifford					
Cornell				30,856	11,816
Cuff					
Cundy					
Curry			12,803	21,851	17,534
Cyclops		6,028	46,158	14,368	12,644
Eleanor (Appleton)					
Emmett		12,397	22,474	31,136	648
Forest					
Half and Half					
Hamilton					
Hersel					
Indiana					
Keel Ridge				11,496	19,511
Loretto					
Ludington				8,816	3,374
Millie (Hewitt)					4,352
Munro					
Norway		7,276	73,519	198,165	137,077
Penn Iron Mining Co					
Perry					
Pewabec					
Quinnesec		25,925	41,954	52,436	43,711
Saginaw (Perkins)			13,465	49,196	60,406
Stephenson			798	23,089	10,856
Sturgeon River					
Verona					
Vivian					
Vulcan	4,593	38,799	56,975	86,976	85,274
Walpole					
Total	10,405	95,221	269,609	568,300	541,724
METROPOLITAN TROUGH.					
Groveland					
Metropolitan					
Northwestern					
Total					
CALUMET TROUGH.					
Calumet					

[1]From Iron Trade Review.

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(*Continued.*)

	1882.	1883.	1884.	1885.	1886.
Antoine	.....	.....	.....	.....	.....
Aragon	.....	.....	.....	.....	.....
Breen	.....	.....	.....	.....	.....
Briar Hill	10,593	4,388	.....	.....	.....
Chapin	247,506	265,830	290,972	157,455	198,871
Clifford	.....	.....	.....	.....	.....
Cornell	.....	.....	.....	.....	4,566
Cuff	.....	.....	.....	.....	.....
Cundy	.....	.....	.....	.....	.....
Curry	13,374	3,676	10,079	4,897	.....
Cyclops	18,287	22,675	24,099	49,897	37,189
Eleanor (Appleton)	.....	.....	.....	.....	.....
Emmett	.....	.....	.....	.....	.....
Forest	.....	.....	.....	.....	.....
Half and Half	.....	.....	.....	.....	.....
Hamilton	.....	.....	.....	.....	872
Hersel	.....	.....	.....	.....	.....
Indiana	4,280	4,362	636	2,739	5,854
Keel Ridge	23,425	5,033	.....	.....	.....
Loretto	.....	.....	.....	.....	.....
Ludington	52,152	102,632	101,165	124,194	74,454
Millie (Hewitt)	9,500	7,516	7,927	4,627	5,517
Munro	.....	.....	.....	.....	.....
Norway	165,547	114,836	71,710	67,741	93,878
Penn Iron Mining Co	.....	.....	.....	.....	.....
Perry	.....	3,138	.....	.....	.....
Pewabec	.....	.....	.....	.....	.....
Quinnesec	44,240	21,676	16,995	14,110	13,442
Saginaw (Perkins)	73,648	76,514	38,120	18,020	12,852
Stephenson	.....	.....	.....	.....	1,018
Sturgeon River	.....	.....	.....	.....	.....
Verona	.....	.....	.....	.....	.....
Vivian	.....	.....	.....	.....	.....
Vulcan	94,042	79,874	101,722	124,125	143,930
Walpole	.....	.....	.....	.....	.....
Total	756,594	712,150	663,425	567,805	592,443
METROPOLITAN TROUGH.					
Groveland	.....	.....	.....	.....	.....
Metropolitan	23,854	36,643	27,577	.....	6,393
Northwestern	.....	7,202	10,004	.....	.....
Total	23,854	43,845	37,581	.....	6,393
CALUMET TROUGH.					
Calumet	5,847	29,239	3,627	.....	.....

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(*Continued.*)

	1887.	1888.	1889.	1890.	1891.
Antoine	.....	.....	.....	.....	.....
Aragon	.....	.....	1,745	46,609	96,829
Breen	.....	.....	.....	.....	.....
Briar Hill	.....	.....	.....	.....	.....
Chapin	336,128	290,871	518,990	742,843	488,749
Clifford	.....	.....	.....	.....	.....
Cornell	2,064	.....	.....	.....	.....
Cuff	.....	.....	.....	.....	.....
Cundy	.....	.....	.....	.....	.....
Curry	.....	5,376	28,722	72,162	100,681
Cyclops	14,297	14,693	6,101	7,361	10,599
Eleanor (Appleton)	.....	.....	.....	.....	.....
Emmett	.....	.....	.....	.....	.....
Forest	.....	.....	.....	.....	.....
Half and Half	.....	.....	5,961	1,496	67
Hamilton	600	8,801	8,347	17,072	58,197
Hersel	.....	.....	.....	955	.....
Indiana	.....	.....	.....	.....	.....
Keel Ridge	.....	.....	.....	.....	.....
Loretto	.....	.....	.....	.....	.....
Ludington	101,653	61,883	116,297	97,355	141,303
Millie (Hewitt)	1,163	11,124	12,274	39,232	5,889
Munro	.....	.....	.....	.....	.....
Norway	95,726	87,260	68,044	61,717	4,089
Penn Iron Mining Co	.....	.....	.....	.....	.....
Perry	.....	.....	.....	.....	.....
Pewabec	.....	.....	.....	26,991	64,507
Quinnesec	6,585	2,249	.....	.....	.....
Saginaw (Perkins)	10,834	16,684	12,354	11,971	.....
Stephenson	3,589	.....	.....	.....	.....
Sturgeon River	6,827	7,800	4,775	.....	.....
Verona	.....	.....	.....	.....	.....
Vivian	.....	.....	.....	.....	.....
Vulcan	205,036	129,541	153,900	104,996	78,967
Walpole	1,740	900	9,614	2,940	3,895
Total	786,244	637,182	947,124	1,233,700	1,053,772
METROPOLITAN TROUGH.					
Groveland	.....	.....	.....	.....	1,049
Metropolitan	9,070	3,490	.....	.....	.....
Northwestern	.....	.....	.....	.....	.....
Total	9,070	3,490	.....	.....	1,049
CALUMET TROUGH.					
Calumet	.....	.....	.....	.....	.....

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(Continued.)

	1892.	1893.	1894.	1895.	1896.
Antoine	.....	.....	.....	27,931	110,821
Aragon	167,948	127,901	138,209	183,296	95,809
Breen	.....	.....	.....	.....	.....
Briar Hill	.....	.....	.....	.....	.....
Chapin	660,052	489,134	235,895	218,589	420,318
Clifford	.....	.....	.....	.....	.....
Cornell	.....	.....	.....	.....	.....
Cuff	.....	.....	.....	.....	.....
Cundy	.....	.....	.....	.....	3,395
Curry	125,773	.....	.....	.....	.....
Cyclops	1,697	.....	.....	.....	.....
Eleanor (Appleton)	4,377	5,618	.....	2,107	.....
Emmett	.....	.....	.....	.....	.....
Forest	.....	.....	.....	.....	.....
Half and Half	.....	.....	.....	.....	.....
Hamilton	2,183	.....	.....	.....	.....
Hersel	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	.....	.....
Keel Ridge	5,997	3,298	.....	19,441	.....
Loretto	8,131	55,983	.....	53,160	34,334
Ludington	15,777	109	354	.....	.....
Millie (Hewitt)	6,780	.....	13,062	10,924	21,815
Munro	.....	.....	.....	.....	.....
Norway	44,767	.....	.....	.....	.....
Penn Iron Mining Co	.....	280,450	175,274	290,622	179,917
Perry	.....	.....	.....	.....	.....
Pewabec	115,273	165,745	303,010	262,551	273,587
Quinnesec	.....	.....	.....	761	.....
Saginaw (Perkins)	.....	.....	.....	2,161	.....
Stephenson	.....	.....	.....	.....	.....
Sturgeon River	.....	.....	.....	.....	.....
Verona	.....	.....	.....	.....	.....
Vivian	.....	.....	.....	.....	.....
Vulcan	179,904	.....	.....	.....	.....
Walpole	.....	.....	.....	.....	.....
Total	1,338,659	1,128,238	866,804	1,471,543	1,139,996
METROPOLITAN TROUGH.					
Groveland	.....	.....	.....	.....	.....
Metropolitan	.....	.....	.....	.....	.....
Northwestern	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....
CALUMET TROUGH.					
Calumet	.....	.....	.....	.....	.....

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(*Continued.*)

	1897.	1898.	1899.	1900.	1901.
Antoine	98,847	104,510	93,025	119,940	63,429
Aragon	149,594	295,821	337,807	404,645	477,212
Breen	.....	.....	.....	.....	.....
Briar Hill	.....	.....	.....	.....	.....
Chapin	643,402	724,768	940,513	929,937	929,701
Clifford	.....	.....	.....	.....	.....
Cornell	.....	.....	.....	.....	.....
Cuff	.....	.....	20,210	38,209	.....
Cundy	41,942	76,877	100,902	141,148	178,800
Curry	.....	.....	.....	.....	.....
Cyclops	.....	.....	.....	.....	.....
Eleanor (Appleton)	.....	.....	.....	.....	.....
Emmett	.....	.....	.....	.....	.....
Forest	.....	.....	.....	.....	.....
Half and Half	.....	.....	.....	.....	.....
Hamilton	.....	.....	.....	.....	.....
Hersel	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	.....	.....
Keel Ridge	.....	.....	4,900	.....	.....
Loretto	54,104	68,447	64,824	61,219	54,985
Ludington	.....	.....	.....	.....	.....
Millie (Hewitt)	10,374	17,430	15,194	14,922	12,133
Munro	.....	.....	.....	.....	.....
Norway	.....	.....	.....	.....	.....
Penn Iron Mining Co	237,886	223,713	229,651	197,606	358,126
Perry	.....	.....	.....	.....	.....
Pewabec	279,855	305,072	530,129	374,043	507,786
Quinnesec	.....	.....	11,050	25,967	66,383
Saginaw (Perkins)	.....	.....	.....	.....	.....
Stephenson	.....	.....	.....	.....	.....
Sturgeon River	.....	.....	.....	.....	.....
Verona	.....	.....	.....	5,143	11,475
Vivian	.....	.....	.....	.....	.....
Vulcan	.....	.....	.....	.....	.....
Walpole	.....	.....	.....	.....	.....
Total	1,516,004	1,816,638	2,348,205	2,312,779	2,660,030
METROPOLITAN TROUGH.					
Groveland	.....	.....	.....	.....	11,444
Metropolitan	.....	.....	.....	.....	.....
Northwestern	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	11,444
CALUMET TROUGH.					
Calumet	.....	.....	.....	.....	.....

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(Continued.)

	1902.	1903	1904.	1905.	1906.
Antoine	110,993	107,886	81,164	138,395	195,855
Aragon	646,203	522,035	374,944	423,698	431,000
Breen	.....	.....	.....	16,625	21,004
Briar Hill	.....	.....	.....	.....	.....
Chapin	956,812	704,051	541,324	902,628	943,425
Clifford	.....	.....	.....	.....	.....
Cornell	.....	.....	.....	.....	.....
Cuff	.....	.....	.....	.....	.....
Cundy	183,052	111,851	.....	.....	.....
Curry	.....	.....	.....	.....	.....
Cyclops	.....	.....	.....	.....	.....
Eleanor (Appleton)	.....	.....	.....	1,819	3,121
Emmett	.....	.....	.....	.....	.....
Forest	.....	.....	11,988	.....	.....
Half and Half	.....	.....	.....	.....	.....
Hamilton	.....	.....	.....	.....	.....
Hersel	.....	.....	.....	.....	.....
Indiana	.....	.....	.....	.....	.....
Keel Ridge	.....	.....	.....	.....	.....
Loretto	128,300	87,939	54,720	118,738	140,390
Ludington	.....	.....	.....	.....	.....
Millie (Hewitt)	25,935	40,860	.....	.....	36,815
Munro	.....	8,739	32,332	92,183	47,454
Norway	.....	.....	.....	.....	.....
Penn Iron Mining Co	273,443	343,543	141,948	423,244	496,582
Perry	.....	.....	.....	.....	.....
Pewabec	530,291	489,175	372,791	533,413	493,891
Quinnesec	62,531	49,708	33	.....	.....
Saginaw (Perkins)	.....	.....	.....	.....	21,017
Stephenson	.....	.....	.....	.....	.....
Sturgeon River	.....	.....	.....	.....	.....
Verona	43,245	50,910	20,202	.....	.....
Vivian	40,384	12,122	81,354	90,426	122,577
Vulcan	.....	.....	.....	.....	.....
Walpole	.....	.....	.....	.....	.....
Total	3,001,189	2,528,819	1,712,800	2,741,169	2,953,131
METROPOLITAN TROUGH.					
Groveland	7,599	1,294	4,737	.....	.....
Metropolitan	.....	.....	.....	.....	.....
Northwestern	1,324	17,280	.....	.....	.....
Total	8,923	18,574	4,737	.....	.....
CALUMET TROUGH.					
Calumet	.....	.....	.....	.....	15,773

IRON ORE SHIPMENTS FROM THE MENOMINEE DISTRICT, MICHIGAN.

(Concluded.)

	1907.	1908.	1909.	1910.	1911.	1912.	Total.
Antoine	100,996	.....	.....	.....	.....	.....	1,353,792
Aragon	441,636	226,354	246,984	241,046	201,269	244,812	6,523,406
Breen	20,366	.....	.....	.....	.....	.....	75,425
Briar Hill	.....	.....	.....	.....	.....	.....	14,981
Chapin	855,308	391,620	587,647	465,543	357,598	327,999	17,333,556
Clifford	.....	.....	103,626	91,081	90,940	74,144	359,791
Cornell	.....	.....	.....	.....	.....	.....	49,302
Cuff	.....	.....	.....	.....	.....	.....	58,419
Cundy	.....	1,410	5,512	.....	.....	.....	844,889
Curry	.....	.....	.....	.....	.....	.....	416,928
Cyclops	.....	.....	.....	.....	.....	.....	286,093
Eleanor (Appleton)	1,677	.....	.....	.....	.....	.....	18,719
Emmett	.....	.....	.....	.....	.....	.....	66,655
Forest	.....	.....	.....	.....	.....	.....	11,988
Half and Half	.....	.....	.....	.....	.....	.....	7,524
Hamilton	.....	.....	.....	.....	.....	.....	96,072
Hersel	.....	.....	.....	.....	.....	.....	955
Indiana	.....	.....	.....	.....	.....	.....	17,871
Keel Ridge	.....	.....	.....	.....	.....	.....	93,101
Loretto	99,779	13,354	96,613	116,048	18,579	135,177	1,464,824
Ludington	.....	.....	.....	.....	.....	.....	1,001,518
Millie (Hewitt)	18,691	3,322	10,887	.....	18,556	.....	386,821
Munro	46,834	27,773	23,241	20,022	9,303	20,100	327,981
Norway	.....	.....	.....	.....	.....	.....	1,291,352
Penn Iron Mining Co	381,128	176,211	428,004	344,760	377,026	426,743	5,985,877
Perry	.....	.....	.....	.....	.....	.....	3,138
Pewabec	457,796	365,341	465,453	380,376	352,598	279,771	7,930,445
Quinnesec	.....	.....	3,147	744	.....	.....	503,647
Saginaw (Perkins)	26,080	38,669	19,994	.....	.....	.....	501,985
Stephenson	.....	.....	.....	.....	.....	.....	39,350
Sturgeon River	.....	.....	.....	.....	.....	.....	19,404
Verona	.....	.....	.....	.....	.....	.....	130,975
Vivian	48,493	10,056	.....	14,827	5,971	28,800	455,010
Vulcan (with Penn Mines)	.....	.....	.....	.....	.....	.....	1,668,654
Walpole	.....	.....	.....	.....	.....	.....	19,089
Total	2,498,784	1,254,110	1,991,108	1,674,447	1,431,840	1,537,546	49,359,537
METROPOLITAN TROUGH.							
Groveland	13,913	9,123	24,933	26,462	33,758	12,468	146,780
Metropolitan	.....	.....	.....	.....	.....	.....	107,027
Northwestern	.....	.....	.....	.....	.....	.....	35,810
Total	13,913	9,123	24,933	26,462	33,758	12,468	289,617
CALUMET TROUGH.							
Calumet	51,646	15,222	.....	.....	.....	35,587	156,941

IRON ORE SHIPMENTS FROM THE GWINN DISTRICT.[1] (GROSS TONS).

	1872.	1873.	1874.	1875.
(Austin) (Princeton) (Swanzy or Chesire)... Stegmiller (Stephenson)	13,445	9,328	.....	187
Total.....	13,445	9,328	.....	187
	1876.	1877.	1878.	1879.
(Austin) (Princeton) (Swanzy or Chesire)..... Stegmiller (Stephenson)	225	8,444	16,924	17,985
Total.....	225	8,444	16,924	17,985
	1880.	1881.	1882.	1883.
(Austin) (Princeton) (Swanzy or Chesire)..... Stegmiller (Stephenson)	13,302	15,011	31,498	13,730
Total.....	13,302	15,011	31,498	13,730
	1884.	1885.	1886.	1887.
(Austin) (Princeton) (Swanzy or Chesire)..... Stegmiller (Stephenson)	3,557	.....	8,328	2,142
Total.....	3,557	.....	8,328	2,142
	1888.	1889.	1890.	1891.
(Austin) (Princeton) (Swanzy or Chesire)..... Stegmiller (Stephenson)	.....	.....	.....	7,301
Total.....	.....	.....	.....	7,301

[1]From Iron Trade Review.

IRON ORE SHIPMENTS FROM THE GWINN DISTRICT. (GROSS TONS)

(Concluded.)

	1892.	1893.	1894.	1895.
(Austin) (Princeton) (Swanzy or Chesire) Stegmiller (Stephenson)	29,403	19,096	.....	6,593
Total	29,403	19,096	.....	6,593

	1896.	1897.	1898.	1899.
(Austin) (Princeton) (Swanzy or Chesire) Stegmiller (Stephenson)	.....	.....	25,247	55,802
Total	.....	.....	25,247	55,802

	1900.	1901.	1902.	1903.
(Austin) (Princeton) (Swanzy or Chesire) Stegmiller (Stephenson)	75,037	67,051	118,048	84,223
Total	75,037	67,051	118,048	84,223

	1904.	1905.	1906.	1907.
(Austin)	.....	.....	.....	195,950
(Princeton) (Swanzy or Chesire)	76,461	129,079	166,894	177,863
Stegmiller (Stephenson)	.....	.....	.....	6,305
Total	76,461	129,079	166,894	380,118

	1908.	1909.	1910.	1911.	1912.	Total.
(Austin)	111,229	125,858	188,588	110,839	102,530	834,994
(Princeton) (Swanzy or Chesire)	36,033	42,934	89,441	54,442	143,519	1,558,573
Stegmiller	.....	39,869	48,842	45,122	50,963	184,796
(Stephenson)	52,588	64,075	225,726	135,474	214,386	698,554
Total	199,850	272,736	552,597	345,877	511,398	3,276,917

LIST OF THE ACTIVE IRON MINES OF MICHIGAN,

Name of mine.	Location.				First shipment.	No. of men employed.
	County.	Section.	Twp.	Range.		
MARQUETTE RANGE:						
American	Marquette	32	48	28	1880	275
Angeline	Marquette	15	47	27	1864	327
Bessie	Marquette	35	46	29	1891	.....
Breitung Hematite No. 1	Marquette	8	47	26	1903	94
Breitung Hematite No. 2	Marquette	8	47	26	.....	79
Cambria	Marquette	35	48	27	1875	9
Champion	Marquette	31, 32	48	29	1867	15
Cliff Shaft	Marquette	9, 10	47	27	1887	265
Empire	Marquette	19	47	26	1907	12
Hartford	Marquette	36	48	27	1889	.....
Imperial	Baraga	25	48	31	1890	7
Jackson	Marquette	1	47	27	1846	25
Lake	Marquette	10	47	27	1892	265
Lake Superior (Hard Ore)	Marquette	9, 10	47	27	1858	258
Lake Superior (Soft Ore)	Marquette	10	47	27	1858	75
Lillie	Marquette	35	48	27	1875	27
Lloyd	Marquette	6	47	27	1911	130
Lucy	Marquette	6, 7	47	26	1878	.....
Maas	Marquette	31	48	26	1907	71
Mitchell	Marquette	21	47	27	1886	40
Maitland	Marquette	30	47	26	.....	.....
Mary Charlotte	Marquette	8	47	26	1903	372
Morris	Marquette	1	47	28	1912	77
Milwaukee-Davis	Marquette	7	47	26	1879	44
Moro	Marquette	10	47	27	1881	.....
Negaunee	Marquette	5, 6	47	26	1887	324
Ogden	Marquette	13	47	27	1892	.....
Ohio	Baraga	22	48	31	1882	2
Portland	Baraga	26	48	31	1896	7
Queen	Marquette	5	47	26	1888	332
Republic	Marquette	7	46	29	1872	375
Richmond	Marquette	28	47	26	1896	38
Rolling Mill	Marquette	7	47	26	1872	160
Salisbury	Marquette	15	47	27	1872	145
Volunteer	Marquette	30	47	26	1871	51
Washington	Marquette	11	47	29	1865	149
SWANEY DISTRICT:						
Austin	Marquette	20	45	25	1907	125
Princeton	Marquette	18, 20	45	25	1872	36
Stegmiller	Marquette	17	45	25	1909	64
Stephenson	Marquette	20	45	25	1907	273
MENOMINEE RANGE:						
Antoine	Dickinson	17, 20	40	30	1895	.....
Aragon	Dickinson	8, 9	39	29	1889	285
Chapin	Dickinson	25, 30	40	31, 30	1880	526
Cyclops & Norway	Dickinson	5	39	29	1878	.....
East Vulcan	Dickinson	10, 11	39	29	1877	.....
Loretto	Dickinson	7	39	28	1893	120
Millie (Hewitt)	Dickinson	31	40	34	1881	2
Munro	Dickinson	6	39	29	1903	15
Pewabic	Dickinson	32	40	30	1890	328
Quinnesec	Dickinson	34	40	30	1878	.....
Vivian	Dickinson	34	40	30	1902	2
West Vulcan, Curry & Brier Hill	Dickinson	9, 10	39	29	1879	775[1]
Clifford and Traders	Dickinson	20	40	30	.....	2
METROPOLITAN TROUGH:						
Groveland	Dickinson	31	42	29	1891	25
CALUMET TROUGH:						
Calumet	Dickinson	8	41	23	1882	2

[1]Includes Cyclops, Norway and East Vulcan.

1912, WITH LOCATION, OWNERSHIP, SALES AGENTS, ETC.

Depth 1912.	Operators.	Sales agents.
1,300	American Boston Mining Co.....	M. A. Hanna & Co., Cleveland, Ohio.
615	Pittsburg & Lake Angeline Iron Co.	
200	John M. Longyear.....	John M. Longyear, Marquette, Michigan.
525	Breitung Hematite Mng. Co.....	E. N. Breitung & Co., Cleveland, Ohio.
435	Breitung Hematite Mng. Co.....	E. N. Breitung & Co., Cleveland, Ohio.
975	Republic Iron & Steel Co.....	M. A. Hanna & Co., Cleveland, Ohio.
2,292	Oliver Iron Mining Co.	
736	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
200	Empire Iron Co.....	Oglebay, Norton & Co., Cleveland, Ohio.
1,075	Republic Iron & Steel Co.....	M. A. Hanna & Co., Cleveland, Ohio.
208	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
Open pit	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
573	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
1,070	Oliver Iron Mining Co.	
820	Oliver Iron Mining Co.	
1,000	Republican Iron & Steel Co.....	M. A. Hanna & Co., Cleveland, Ohio.
400	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
281	Cleveland Cliffs Iron Co.	
1,100	Cleveland Cliffs Iron Co.	
768	Pittsburg & Lake Angeline Iron Co.	Jones & Laughlin Ore Co., Pittsburg, Pa.
508	Volunteer Ore Co.	
435	Mary Charlotte Mining Co.....	E. N. Breitung & Co., Cleveland, Ohio.
800	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
525	Mary Charlotte Mining Co.....	E. N. Breitung & Co., Cleveland, Ohio.
812	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
986	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
Open pit	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
250	Niagara Iron Mining Co.....	Rogers Brown Iron Co., Buffalo, N. Y.
200	Niagara Iron Mining Co.....	Rogers Brown Iron Co., Buffalo, N. Y.
1,010	Oliver Iron Mining Co.	
1,950	Republic Iron Co.....	M. A. Hanna & Co., Cleveland, Ohio.
Open pit	Richmond Iron Co.....	M. A. Hanna & Co., Cleveland, Ohio.
698	Jones & Laughlin Ore Co.	
1,107	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
428	Volunteer Ore Co.	
572	Washington Iron Co.....	E. N. Breitung & Co., Cleveland, Ohio.
350	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
782	Cleveland Cliffs Iron Co.....	Cleveland Cliffs Iron Co., Cleveland, Ohio.
346	Oliver Iron Mining Co.	
413	Cleveland Cliffs Iron Co.	
135	.....	Oglebay, Norton & Co., Cleveland, Ohio.
1,155	Oliver Iron Mining Co.	
1,522	Oliver Iron Mining Co.	
355	Penn Iron Mining Co.	
1,400	Penn Iron Mining Co.	
800	Loretto Iron Co.....	M. A. Hanna & Co., Cleveland, Ohio.
600	Dessau Mining Co.....	M. A. Hanna & Co., Cleveland, Ohio.
141	Munro Mining Co.....	Rogers, Brown Iron Co., Buffalo, N. Y.
941	Pewabic Co.....	Pickands, Mather & Co., Cleveland, Ohio.
450	Corrigan, McKinney Co.....	Corrigan, McKinney & Co., Cleveland, Ohio.
310	Verona Mining Co.....	Pickands, Mather & Co., Cleveland, Ohio.
1,500	Penn Iron Mining Co.	
150	Antoine Ore Company.	
275	Groveland Mining Co.....	Lake Erie Ore Co., Cleveland, Ohio.
215	Verona Mining Co.....	Pickands, Mather & Co., Cleveland, Ohio.

LIST OF THE ACTIVE IRON MINES OF MICHIGAN.

Name of mine.	Location.				First shipment.	No. of men employed.
	County.	Section.	Twp.	Range.		
Crystal Falls District:						
Tobin	Iron	30	43	32	1901	222
Armenia	Iron	23	43	32	1889	154
Bristol	Iron	19	43	32	1892	208
Dunn	Iron	1	42	33	1887	130
Genesee	Iron	29,30,31	43	32	1902	.....
Great Western	Iron	21	43	32	1882	38
Gibson	Iron	15	44	33	1885	2
Hemlock	Iron	4	44	33	1891	157
Hollister	Iron	13	43	33	1890	65
Mansfield	Iron	17, 20	43	31	1890	103
McDonald	Iron	23	43	32	1909	34
Michigan	Iron	9	44	33	1893	39
Ravenna	Iron	19	43	32	1911	72
Iron River District:						
Tully	Iron	36	49	35	1910	45[1]
Baker	Iron	31	43	34	1909	.....
Berkshire	Iron	6	42	34	1908	11
Caspian	Iron	1	42	35	1903	293
Chatham	Iron	35	43	35	1907	114
Cortland	Iron	34	43	35	1912	64
Davidson No. 1	Iron	23	43	35	.....	66
Davidson No. 2	Iron	14	43	35	.....	92
Fogarty	Iron	1	42	35	1907	164[2]
Hiawatha	Iron	35	43	35	1893	103
Wauseca	Iron	23	43	35	1910	26
Nanaimo	Iron	26	43	35	1886	.....
Osana	Iron	23	43	35	1907	75
Riverton	Iron	1, 35, 36	42, 43	35	1898	181
Virgil	Iron	24	43	35	1912	36
Wickwire	Iron	35	43	35	1911	65
Youngs	Iron	12	42	35	1905	110
Chicagon	Iron	26	43	34	1911	109
Zimmerman	Iron	7	42	34	1908	350
Baltic	Iron	7	42	34	1901	164[2]
Gogebic Range:						
Anvil	Gogebic	14	47	46	1887	53
Asteroid	Gogebic	13	47	46	1906	89
Ashland	Gogebic	22	47	47	1885	.....
Brotherton	Gogebic	9	47	45	1886	149
Castile	Gogebic	10	47	45	1906	130
Colby	Gogebic	16	47	46	1884	.....
Eureka	Gogebic	13	47	46	1890	97
Ironton	Gogebic	17	47	46	1886	604[3]
Mikado	Gogebic	18	47	45	1895	39
Newport	Gogebic	24	47	47	1886	850
Norrie-Aurora	Gogebic	22, 23	47	47	1884	1,180
Palms	Gogebic	14	47	46	1912	38
Puritan	Gogebic	17	47	46	1886	184[4]
Sunday Lake	Gogebic	10	47	45	1885	176
Tilden	Gogebic	15	47	46	1891	284
Yale	Gogebic	16	47	46	1901	119

[1]Baker and Tully. [2]Baltic and Fogarty. [3]Colby and Ironton.
[4]Davis, Geneva, Puritan and Royal.

1912, WITH LOCATION, OWNERSHIP, SALES AGENTS, ETC.—*Concluded.*

Depth 1912.	Operators.	Sales agents.
1,109	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
690	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
960	Bristol Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
1,327	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
.....	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
1,250	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
.....	Munro Iron Mining Co	Rogers, Brown Iron Co., Buffalo, N. Y.
1,000	Hemlock River Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
600	Hollister Mining Co	M. A. Hanna & Co., Cleveland, Ohio.
1,450	Oliver Iron Mining Co.	
417	McDonald Mining Co	The Lake Erie Ore Co., Cleveland, Ohio.
611	Oliver Iron Mining Co.	
350	Hollister Mining Co	M. A. Hanna & Co., Cleveland, Ohio.
548	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
548	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
365	Brule Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
292	Verona Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
700	Brule Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
205	Wickwire Mining Co	Wickwire Steel Co., Buffalo, N. Y.
450	Davidson Ore Mining Co.	
150	Davidson Ore Mining Co.	
265	Verona Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
757	Munro Mining Co	The Rogers, Brown Iron Ore Co., Buffalo, N. Y.
398	Mineral Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
362	Mineral Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
428	Mineral Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
802	Oliver Iron Mining Co.	
200	Wickwire Mining Co	Wickwire Steel Co., Buffalo, N. Y.
515	Huron Iron Co	The Lake Erie Ore Co., Cleveland, Ohio.
165	Wickwire Mining Co	Wickwire Steel Co., Buffalo, N. Y.
500	Munro Mining Co.	
350	Spring Valley Iron Co.	
553	Verona Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
1,750	Newport Mining Co	M. A. Hanna & Co., Cleveland, Ohio.
960	Castile Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
1,324	Cleveland Cliffs Iron Co	Cleveland Cliffs Iron Co., Cleveland, Ohio.
1,630	Brotherton Iron Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
1,350	Castile Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
1,300	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
1,350	Castile Mining Co	Oglebay, Norton & Co., Cleveland, Ohio.
1,350	Corrigan, McKinney Co	Corrigan, McKinney Co., Cleveland, Ohio.
1,120	Verona Mining Co	Pickands, Mather & Co., Cleveland, Ohio.
2,200	Newport Mining Co	M. A. Hanna & Co., Cleveland, Ohio.
1,670	Oliver Iron Mining Co.	
650	Dunn Iron Mining Co	M. A. Hanna & Co., Cleveland, Ohio.
1,264	Oliver Iron Mining Co.	
1,688	Sunday Lake Iron Co	Pickands, Mather & Co., Cleveland, Ohio.
1,550	Oliver Iron Mining Co.	
1,780	Lake Superior Iron & Chemical Co.	Oglebay, Norton & Co., Cleveland, Ohio.

PIG IRON PRODUCTION.

Year.	Michigan production.	U. S. Production.			Total.
		Charcoal.	Anthracite.	Bituminous.	
1854	.....	342,298	339,435	54,485	736,218
1855	.....	339,922	381,866	62,390	784,178
1856	.....	370,470	443,113	69,554	883,137
1857	.....	330,321	390,385	77,451	798,157
1858	.....	285,313	361,430	58,351	705,094
1859	.....	284,041	471,745	84,841	840,627
1860	.....	278,331	519,211	122,228	919,770
1861	.....	195,278	409,229	127,037	731,544
1862	.....	186,660	470,315	130,687	787,662
1863	.....	212,005	577,638	157,961	947,604
1864	.....	241,853	684,018	210,125	1,135,996
1865	.....	262,342	479,558	189,682	931,582
1866	.....	332,580	749,367	268,396	1,350,343
1867	.....	344,341	798,638	318,647	1,461,626
1868	.....	370,000	893,000	340,000	1,603,000
1869	.....	392,150	971,150	553,341	1,916,641
1870	.....	365,000	930,000	570,000	1,865,000
1871	.....	385,000	956,608	570,000	1,911,608
1872	86,840	500,587	1,369,812	984,159	2,854,558
1873	113,975	577,620	1,312,754	977,904	2,868,278
1874	128,965	576,557	1,202,144	910,712	2,689,413
1875	101,805	410,990	908,046	947,545	2,266,581
1876	82,477	308,649	794,578	990,009	2,093,236
1877	75,216	317,843	934,797	1,061,945	2,314,585
1878	70,853	293,399	1,092,870	1,191,092	2,577,361
1879	101,539	358,873	1,273,024	1,438,978	3,070,875
1880	154,424	537,558	1,807,651	1,950,025	4,295,414
1881	187,043	638,838	1,734,462	2,268,264	4,641,564
1882	210,195	697,906	2,042,138	2,438,078	5,178,122
1883	173,185	571,726	1,885,596	2,689,650	5,146,972
1884	172,834	458,418	1,586,453	2,544,742	4,589,613
1885	143,121	399,844	1,454,390	2,675,635	4,529,869
1886	190,734	459,557	2,099,597	3,806,174	6,365,328
1887	190,663	529,457	1,901,256	2,957,232	6,387,945
1888	190,403	598,789	1,925,729	4,743,989	7,268,507
1889	191,395	644,300	1,920,354	5,952,414	8,517,068
1890	230,769	703,522	2,448,781	7,154,725	10,307,028
1891	213,145	576,964	1,866,108	5,836,798	8,279,870
1892	184,421	537,621	1,797,113	6,822,266	9,157,000
1893	117,538	386,789	1,347,529	5,390,184	7,124,502
1894	95,171	222,422	914,742	5,520,224	6,657,388
1895	91,222	225,341	1,270,899	7,950,068	9,446,308
1896	149,511	310,244	1,146,412	7,166,471	8,623,127
1897	132,578	255,211	932,777	8,464,692	9,652,680
1898	147,640	296,750	1,203,273	10,273,911	11,773,934
1899	134,443	284,766	1,599,552	11,736,385	13,620,703
1900	163,712	299,124	1,841,857	12,253,818	13,789,242
1901	170,762	390,147	1,712,527	13,782,386	15,878,354
1902	155,213	378,504	1,115,247	16,315,891	17,821,307
1903	244,709	504,757	1,911,347	15,592,221	18,009,252
1904	233,225	337,529	1,228,140	14,931,364	16,497,633
1905	288,704	352,928	*1,300,000	*21,339,452	22,992,380
1906	369,456	433,007	1,305,094	23,313,498	25,307,191
1907	436,507	437,397	1,371,554	23,972,410	25,781,361
1908	348,096	249,146	355,009	15,331,865	15,936,018
1909	964,289	376,003	698,431	24,721,037	25,795,471
1910	1,250,103	394,377	649,082	26,255,086	27,298,545
1911	542,193	278,676	212,548	23,141,296	23,649,547
1912	459,975	347,025	236,467	29,132,733	29,726,937

*Estimated.

PRODUCTION, VALUE, ETC., OF PORTLAND CEMENT IN MICHIGAN AND UNITED STATES, 1896-1912.

Year.	No. of plants in operation.	Michigan Rank.	No. of kilns, Rotary.	Daily capacity.	Michigan Cement made. Bbls.	U. S. Cement made. Bbls.	Michigan Per cent made.	Change Per cent in production.	Michigan Cement shipped. Bbls.	Michigan Cement shipped. Value.	U. S. Cement shipped. Value.	Michigan Per cent of value.	Michigan Stock on hand Dec. 31. Bbls.	Michigan average price per barrel.	U. S. average price per barrel.
1896	1	....	....	.....	4,000	1,543,023	0.25	.....	.....	7,000	2,424,011	0.29	.....	$1.75	$1.57
1897	2	....	....	.....	15,000	2,677,775	0.56	275.0	.....	26,250	4,315,891	0.60	.....	1.75	1.61
1898	2	....	....	.....	77,000	3,692,284	2.11	413.3	.....	134,750	5,970,773	2.3	.....	1.747	1.62
1899	4	4	....	.....	343,586	5,652,266	6.1	346.2	.....	513,849	8,074,371	6.36	.....	1.492	1.43
1900	6	2	....	.....	664,750	8,482,020	7.8	93.4	.....	830,990	9,280,525	8.9	.....	1.25	1.09
1901	10	3	....	.....	1,025,718	12,711,225	8.0	54.1	.....	1,128,290	12,532,360	9.0	.....	1.10	0.99
1902	10	3	....	.....	1,577,006	17,230,644	9.1	53.7	.....	2,134,396	20,864,078	10.2	.....	1.353	1.21
1903	13	3	....	.....	1,955,183	23,342,973	8.7	23.9	.....	2,674,780	27,713,319	9.7	.....	1.367	1.24
1904	16	4	....	.....	2,247,160	26,505,881	8.5	14.9	.....	2,365,656	23,355,119	10.1	.....	1.052	0.88
1905	16	5	....	.....	2,773,283	35,246,812	7.9	23.4	.....	2,921,507	33,245,867	8.7	.....	1.053	0.94
1906	14	4	....	.....	3,747,525	46,463,424	8.06	35.5	.....	4,814,965	52,466,186	9.2	.....	1.284	1.13
1907	14	4	....	.....	3,572,668	48,785,390	7.3	—4.6	.....	4,384,731	53,992,551	8.1	.....	1.227	1.11
1908	15	7	....	.....	2,892,576	51,072,612	5.6	—19.0	.....	2,556,215	43,547,679	5.8	.....	0.883	0.85
1909	12	7	....	.....	3,212,751	64,991,431	4.9	11.6	.....	2,619,259	52,858,354	4.9	.....	0.815	0.813
1910	12	8	....	.....	3,687,719	76,549,951	4.8	11.7	.....	3,378,940	66,205,800	4.9	.....	0.916	0.891
1911	11	8	96	22,400	3,686,716	78,528,637	4.69	—0.03	.....	3,024,676	66,248,817	4.56	506,758	0.820	0.843
1912	10	8	92	19,450	3,494,621	82,438,096	4.23	—5.21	3,651,094	3,145,001	69,109,800	4.55	370,956	0.861	0.813

PRODUCTION OF COAL IN MICHIGAN, 1860-1910, IN SHORT TONS.

Year.	Quantity. Tons.	Year.	Quantity. Tons.	Year.	Quantity. Tons.	Year.	Quantity. Tons.	Year.	Quantity. Tons.
1860	2,320	1871	32,000	1882	135,339	1893	45,979	1904	1,342,840
1861	3,000	1872	33,600	1883	71,296	1894	70,022	1905	1,473,211
1862	5,000	1873	56,000	1884	36,712	1895	112,322	1906	1,346,338
1863	8,000	1874	58,000	1885	45,178	1896	92,882	1907	2,035,858
1864	12,000	1875	62,500	1886	60,434	1897	223,592	1908	1,835,019
1865	15,000	1876	66,000	1887	71,461	1898	315,722	1909	1,784,692
1866	20,000	1877	69,197	1888	81,407	1899	624,708	1910	1,534,967
1867	25,000	1878	85,322	1889	67,431	1900	849,475	1911	1,476,074
1868	28,000	1879	82,015	1890	74,977	1901	1,241,241	1912	1,164,973
1869	29,980	1880	100,800	1891	80,307	1902	964,718		
1870	28,150	1881	112,000	1892	77,990	1903	1,367,619	Total	21,638,668

PRODUCTION, COST, ETC., OF COAL IN MICHIGAN BY MONTHS IN 1912.

	No. of mines operated.	Average number of employees.	Average No. of hours worked per day.	Average number of days worked per month.	Average daily wages.	No. of mines using powder.	No. of kegs of powder used.	Tons of pick coal mined.	Tons of machine coal mined.	Total tonnage of coal mined.	Total cost of mining.	Aver. cost per ton.
January	26	2,720	7.9	23.9	$2.98	23	4,754	82,282	69,841	152,123	$298,350 28	$1 96
February	26	2,708	7.9	20.9	2.90	24	3,922	77,061	60,817	137,878	226,099 92	1 63
March	26	2,657	7.9	24.3	3.30	24	4,251	82,410	81,942	164,352	272,808 84	1 65
April	8	142	7.9	13.1	2.83	4	130	2,544	.....	2,544	5,355 09	2 10
May	7	409	8	4.8	2.09	3	237	2,520	.....	2,520	6,567 71	2 60
June	14	1,413	8	14.3	3.40	13	2,035	32,578	9,427	42,005	92,106 46	2 19
July	16	1,574	8.1	18.2	3.37	15	2,133	44,034	22,688	66,722	134,268 50	2 05
August	18	1,702	8	22	2.76	17	2,894	46,848	39,752	86,600	163,052 22	1 88
September	21	2,017	8	19.5	3.75	20	3,262	53,432	50,928	104,360	206,416 09	1 97
October	24	2,378	8	23.1	3.41	22	4,103	66,737	65,269	132,006	251,536 15	1 90
November	24	2,447	8	21.7	3.05	22	3,941	62,402	67,510	129,912	245,440 75	1 88
December	24	2,471	7.8	22.9	3.18	21	4,275	70,491	73,460	143,951	270,081 89	1 81
Totals	24	2,471	7.9	19.1	3.09	24	35,937	623,339	541,634	1,164,973	$2,172,083 90	1 87

PRODUCTION OF COAL BY COUNTIES, 1899-1912.

	Bay.	Eaton.	Ingham.	Jackson.	Saginaw.	Shiawassee.	Tuscola.	Other counties.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
*1912..	607,740	374	3,874	.....	489,198	4,532	59,252	.....
1911...	766,470	100	.....	.....	667,282	13,000	66,427	19,000
1910...	766,470	100	.....	.....	667,282	.....	.....	101,215
1909...	822,577	558	.....	1,500	859,434	.....	.....	100,623
1908...	782,503	2,286	.....	5,539	999,338	.....	.....	45,353
1907...	962,574	5,982	.....	5,645	1,047,927	.....	.....	13,730
1906...	481,398	18,507	.....	8,658	835,475	.....	.....	2,300
1905...	544,154	4,058	.....	9,196	915,803	.....	.....	.....
1904...	410,634	9,057	.....	16,860	906,289	.....	.....	.....
1903...	325,021	7,393	.....	23,307	1,011,898	.....	.....	.....
1902...	248,645	8,800	.....	23,889	670,304	.....	.....	13,400
1901...	253,821	4,803	.....	20,288	938,042	.....	.....	24,284
1900...	190,814	4,530	.....	23,317	601,112	.....	.....	.....
1899...	104,588	3,421	.....	21,600	455,607	.....	.....	39,492

*Compiled from Annual Report of State Department of Labor for 1912.

*PRODUCTION, COST, ETC., OF COAL IN MICHIGAN BY MONTHS AND BY COUNTIES, IN 1912.

January.

County.	Number of mines operated.	Number of employes.	Average number of hours worked per day.	Average number of days worked per month.	Average daily wages.	Total amount of wages.	No. of mines using powder.	No. of kegs of powder used.	No. of tons of picked coal mined.	No. of tons machine coal mined.	Total number of tons of coal mined.	Total cost of output.	Average cost per ton.
Bay	10	1,393	8	24.9	$2 82	$98,048 22	10	2,310	44,790	36,052	80,842	$137,876 88	$1 75
Eaton	1	5	7.2	25.4	1 53	195 05	.....	.....	110	.....	110	182 50	1 65
Ingham	1	14	8	25	2 14	749 00	.....	.....	493	.....	493	1,108 25	2 24
Saginaw	11	1,135	8	21	3 43	81,809 16	11	2,160	31,448	32,020	63,468	144,664 90	1 80
Shiawassee	2	5	8	24	2 50	300 00	1	2	135	.....	135	297 00	2 20
Tuscola	1	168	8	23	3 31	12,789 84	1	282	5,306	1,769	7,075	14,220 75	2 01
Totals	26	2,720	7.9	23.9	$2 98	$193,891 27	23	4,754	82,282	69,841	152,123	$298,350 28	$1 96

February.

Bay	10	1,390	8	20.6	$2 64	$75,691 84	10	1,895	39,202	29,026	68,228	$109,887 51	$1 61
Eaton	1	2	6	26	1 40	72 80	.....	.....	40	.....	40	60 00	1 50
Ingham	1	14	8	25	2 14	649 00	.....	.....	673	.....	673	1,514 25	2 25
Saginaw	11	1,120	8	21.1	3 16	74,930 46	11	1,614	30,873	29,898	60,771	99,464 47	1 47
Shiawassee	2	17	8	21.1	2 52	904 80	2	24	595	.....	595	864 50	1 45
Tuscola	1	165	8	23	3 34	12,445 30	1	389	5,678	1,893	7,571	14,309 19	1 89
Totals	26	2,708	7.9	20.9	$2 90	$164,694 20	24	3,922	77,061	60,817	137,878	$226,099 92	$1 63

March.

Bay	10	1,369	8	23.4	$3 40	$109,158 36	10	2,026	44,393	39,869	84,262	$143,674 71	$1 75
Eaton	1	2	6	26	1 40	72 80	.....	.....	40	.....	40	60 00	1 50
Ingham	1	14	8	25	2 25	787 50	.....	.....	349	.....	349	785 25	2 25
Saginaw	11	1,091	8	25.4	3 19	88,613 01	11	1,923	31,008	40,066	71,074	112,023 99	1 57
Shiawassee	2	23	8	17.7	2 41	983 32	2	17	600	.....	600	933 32	1 55
Tuscola	1	158	8	26	3 30	13,556 40	1	285	6,020	2,007	8,027	15,331 57	1 91
Totals	26	2,657	7.9	24.3	$3 30	$213,171 39	24	4,251	82,410	81,942	164,352	$272,808 84	$1 65

*Compiled from the Annual Report of the Department of Labor for 1912.

PRODUCTION, COST, ETC., OF COAL IN MICHIGAN BY MONTHS AND BY COUNTIES, IN 1912.—*Continued.*

April.

County.	Number of mines operated.	Number of employes.	Average number of hours worked per day.	Average number of days worked per month.	Average daily wages.	Total amount of wages.	Number of mines using powder.	Number of kegs of powder used.	Number of tons of picked coal mined.	Number of tons machine coal mined.	Total number of tons of coal mined.	Total cost of output.	Average cost per ton.
Bay	1	8	8	30	$2 50	$600 00	.....	.....	.....	.....	.....	.....	.....
Eaton	1	1	6	26	1 40	36 40	.....	.....	26	.....	26	$36 40	$1 40
Ingham	1	6	8	17	2 25	229 50	.....	.....	176	.....	176	396 00	2 25
Saginaw	2	81	8	6.1	3 39	1,679 40	2	99	1,425	.....	1,425	2,957 49	2 07
Shiawassee	2	37	8	22.2	2 46	2,024 80	2	31	917	.....	917	1,965 20	2 14
Tuscola	1	9	8	30	2 60	702 00	.....	.....	.....	.....	.....	.....	.....
Totals	8	142	7.9	13.1	$2 83	$5,272 10	4	130	2,544	.....	2,544	$5,355 09	$2 10

May.

Bay	2	308	8	3.7	$1 53	$1,815 00	1	181	1,120	.....	1,120	$3,687 97	$3 29
Eaton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ingham	1	6	9	15	2 20	198 00	.....	.....	89	.....	89	234 35	2 63
Saginaw	2	81	8	5	2 69	1,092 00	1	55	986	.....	986	2,320 39	2 35
Shiawassee	1	5	8	24	2 50	300 00	1	1	325	.....	325	325 00	1 00
Tuscola	1	9	8	30	2 60	702 00	.....	.....	.....	.....	.....	.....	.....
Totals	7	409	8	4.8	$2 09	$4,107 00	3	237	2,520	.....	2,520	$6,567 71	$2 60

June.

Bay	5	785	8	15.3	$3 62	$42,629 46	5	1,008	16,937	6,636	23,573	$52,327 32	$2 21
Eaton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ingham	1	5	9	16	2 45	196 00	.....	.....	69	.....	69	219 65	3 18
Saginaw	6	496	8	13	3 14	20,300 02	6	893	13,516	2,199	15,715	34,519 81	2 19
Shiawassee	1	5	8	24	2 50	300 00	1	1	280	.....	280	280 00	1 00
Tuscola	1	122	8	13	3 41	5,408 26	1	133	1,776	592	2,368	4,759 68	2 01
Totals	14	1,413	8	14.3	$3 40	$68,833 74	13	2,035	32,578	9,427	42,005	$92,106 46	$2 91

PRODUCTION, COST, ETC., OF COAL IN MICHIGAN BY MONTHS AND BY COUNTIES, IN 1912.—*Continued.*

July.

County.	Number of mines operated.	Number of employes.	Average number of hours worked per day.	Average number of days worked per month.	Average daily wages.	Total amount of wages.	Number of mines using powder	Number of kegs of powder used.	Number of tons of picked coal mined.	Number of tons machine coal mined.	Total number of tons of coal mined.	Total cost of output.	Average cost per ton.
Bay	6	803	8.2	19.9	$3 41	$54,631 38	6	1,021	21,567	11,426	32,993	$65,531 52	$1 98
Eaton													
Ingham	1	3	9	23	2 00	138 00			29		29	$150 00	5 17
Saginaw	7	631	8	16.6	3 34	34,941 96	7	939	18,602	10,075	28,677	59,148 34	2 06
Shiawassee	1	5	8	24	2 50	300 00	1	1	275		275	275 00	2 75
Tuscola	1	132	8	15	3 38	6,692 40	1	172	3,561	1,187	4,748	9,163 64	1 93
Totals	16	1,574	8.1	18.2	$3.37	$96,703 74	15	2,133	44,034	22,688	66,722	$134,268 50	$2 05

August.

Bay	7	866	8	22.8	$2.33	$46,030 30	7	1,167	20,961	20,548	41,509	$81,525 03	$1 95
Eaton													
Ingham	1	9	9	24	2 65	572 40			324		324	703 30	2 17
Saginaw	8	684	8	21	3 21	46,214 71	8	1,458	20,108	17,469	37,577	67,873 69	1 86
Shiawassee	1	5	8	24	2 50	300 00	1	1	250		250	250 00	1 00
Tuscola	1	138	8	22	3 40	10,322 40	1	268	5,205	1,735	6,940	12,700 20	1 83
Totals	18	1,702	8	22	$2 76	$103,439 81	17	2,894	46,848	39,752	86,600	$163,052 22	$1 88

September.

Bay	9	1,034	8	21.5	$3 55	$78,989 90	9	1,472	25,592	26,714	52,306	$107,428 94	$2 05
Eaton													
Ingham	1	8	9	21	2 41	404 88			219		219	492 60	2 24
Saginaw	9	835	8	19.9	3 46	57,648 52	9	1,531	22,852	22,658	45,510	86,865 05	1 90
Shiawassee	1	8	8	24	2 50	480	1	1	100		100	300 00	3 00
Tuscola	1	132	8	23	3 35	10,170 60	1	258	4,669	1,556	6,225	11,329 50	1 32
Totals	21	2,017	8	19.5	$3 75	$147,693 90	20	3,262	53,432	50,928	104,360	$206,416 09	$1 97

PRODUCTION, COST, ETC., OF COAL IN MICHIGAN BY MONTHS AND BY COUNTIES, IN 1912.—*Concluded.*

October.

County.	Number of mines operated.	Number of employes.	Average number of hours worked per day.	Average number days worked per month.	Average daily wages.	Total amount of wages.	Number of mines using powder.	Number of kegs of powder used.	Number of tons of picked coal mined.	Number of tons machine coal mined.	Total number of tons of coal mined.	Total cost of output.	Average cost per ton.
Bay	9	1,236	8	24.9	$3 47	$107,162 16	9	2,008	37,893	35,287	73,180	$138,021 78	$1 88
Eaton	1	2	6	26	2 50	130 00	.....	.....	52	.....	52	65 00	1 25
Ingham	1	10	9	21	2 45	514 50	.....	.....	325	.....	325	642 50	1 97
Saginaw	10	996	8	20.7	3 32	68,517 68	10	1,859	23,750	28,527	52,277	100,775 37	1 92
Shiawassee	2	8	8	24.3	2 31	450 00	2	3	350	.....	350	387 50	1 10
Tuscola	1	126	8	25	3 36	10,584 00	1	233	4,367	1,455	5,822	11,644 00	2 00
Totals	24	2,378	8	23.1	$3 41	$187,358 34	22	4,103	66,737	65,269	132,006	$251,536 15	$1 90

November.

Bay	9	1,289	8	22.5	$2 59	$75,147 44	9	1,928	34,344	35,092	69,436	$126,704 33	$1 82
Eaton	1	2	7	27	2 50	135 00	.....	.....	67	.....	67	75 00	1 12
Ingham	1	12	9	30	2 65	954 00	.....	.....	575	.....	575	1,177 60	2 04
Saginaw	10	1,004	8	20.7	3 92	71,602 10	10	1,812	23,486	31,218	54,704	106,652 32	1 95
Shiawassee	2	8	8	24.3	2 31	450 00	2	3	330	.....	330	367 50	1 11
Tuscola	1	132	8	21	3 39	9,397 08	1	198	3,600	1,200	4,800	10,464 00	2 18
Totals	24	2,447	8	21.7	$3 05	$157,685 62	22	3,941	62,402	67,510	129,912	$245,440 75	$1 88

December.

Bay	8	1,294	7.9	23.2	$3 76	$105,596 34	8	2,162	40,967	39,324	80,291	$143,289 83	
Eaton	1	2	7	28	2 00	62 10	.....	.....	42	.....	42	62 10	
Ingham	1	17	9	27	2 00	918 00	.....	.....	553	.....	553	1,000 00	
Saginaw	11	1,027	8	21.8	3 12	82,085 80	11	1,903	24,297	32,717	57,014	113,205 08	
Shiawassee	2	10	8	23.5	2 25	435 00	1	6	375	.....	375	435 00	
Tuscola	1	121	8	23	3 34	9,295 22	1	204	4,257	1,419	5,676	12,089 88	
Totals	24	2,471	7.8	22.9	$3 18	$198,392 46	21	4,275	70,491	73,460	143,951	$270,081 89	
Grand Total	24	2,471	7.9	19.1	$3 09	$1,541,233 57	24	35,937	623,339	541,634	1,164,973	$2,172,083 90	

PRODUCTION AND VALUE OF SALT IN MICHIGAN AND UNITED STATES, 1860-1912.

Year.	U. S. production. Quantity. bbls.	Michigan production.		Per cent of total. Michigan.	Rank of state quantity.	Value. Michigan.	Price. Michigan.
		State Salt Inspectors. Quantity. bbls.	U. S. G. S. Quantity. bbls.				
1860	.....	4,000	.....	.....	.....	.....	.....
1861	.....	125,000	.....	.....	.....	.....	.....
1862	.....	243,000	.....	.....	.....	.....	.....
1863	.....	466,000	.....	.....	.....	.....	.....
1864	.....	529,073	.....	.....	.....	.....	.....
1865	.....	477,200	.....	.....	.....	.....	.....
1866	.....	407,997	.....	.....	.....	$734,395	$1.80
1867	.....	474,721	.....	.....	.....	840,255	1.77
1868	.....	555,690	.....	.....	.....	1,028,027	1.85
1869	.....	561,288	.....	.....	.....	786,835	1.58
1870	.....	621,352	.....	.....	.....	820,185	1.32
1871	.....	728,175	.....	.....	.....	1,063,135	1.46
1872	.....	724,481	.....	.....	.....	1,057,742	1.46
1873	.....	821,346	.....	.....	.....	1,127,984	1.37
1874	.....	1,026,970	.....	.....	.....	1,220,094	1.19
1875	.....	1,081,856	.....	.....	.....	1,190,042	1.10
1876	.....	1,482,729	.....	.....	.....	1,556,865	1.05
1877	.....	1,660,997	.....	.....	.....	1,411,847	0.85
1878	.....	1,855,884	.....	.....	.....	1,577,501	0.85
1879	.....	2,058,040	.....	.....	.....	2,099,200	1.02
1880	5,961,060	2,676,588	2,485,177	41.69	1	2,271,931	0.75
1881	6,200,000	2,750,299	.....	44.35	1	2,418,171	0.85
1882	6,412,373	3,037,317	3,037,317	47.36	1	2,126,122	0.70
1883	6,192,231	2,894,672	3,894,672	46.74	1	2,344,684	0.81
1884	6,514,937	3,161,806	3,161,806	48.53	1	2,392,648	0.757
1885	7,038,653	3,297,403	3,297,403	46.84	1	2,967,663	0.900
1886	7,707,081	3,667,257	3,667,257	47.58	1	2,426,989	0.661
1887	8,003,962	3,944,309	3,944,309	49.17	1	2,291,842	0.581
1888	8,055,881	3,866,228	3,866,228	47.99	1	2,261,743	0.585
1889	8,005,565	3,846,979	3,856,929	48.17	1	2,088,909	0.541
1890	8,776,991	3,838,637	3,838,632	43.72	1	2,302,579	0.600
1891	9,987,945	3,927,671	3,966,748	39.52	1	2,037,289	0.513
1892	11,698,890	3,812,504	3,829,478	32.81	1	2,046,963	0.523
1893	11,897,208	3,514,485	3,057,898	25.70	2	888,837	0.287
1894	12,968,417	3,138,941	3,341,425	26.53	2	1,243,619	0.375
1895	13,669,649	3,529,362	3,343,395	24.46	2	1,048,251	0.315
1896	13,850,726	3,336,242	3,164,238	22.89	2	718,408	0.229
1897	15,973,202	3,622,764	3,993,225	24.99	2	1,243,619	0.313
1898	17,612,634	4,171,916	5,263,564	29.88	2	1,628,081	0.311
1899	19,708,614	4,732,669	7,117,382	36.14	2	2,205,924	0.309
1900	20,869,342	4,738,085	7,210,621	34.55	2	2,033,731	0.282
1901	20,566,661	5,580,101	7,729,641	37.58	1	2,437,677	0.328
1902	23,849,231	4,994,245	8,131,781	34.10	2	1,535,823	0.188
1903	18,968,089	4,387,982	4,297,542	22.65	2	1,119,984	0.260
1904	22,030,002	5,390,812	5,425,904	24.62	2	1,579,206	0.309
1905	25,966,122	5,671,253	9,492,173	35.24	1	1,851,332	0.196
1906	28,172,380	5,644,559	9,936,802	36.31	1	2,018,760	0.203
1907	29,704,128	6,298,463	10,786,630	35.39	1	2,231,129	0.208
1908	28,822,062	6,247,073	10,194,279	35.34	1	2,458,303	0.241
1909	30,107,646	6,055,661	9,966,744	33.10	1	2,732,556	0.274
1910	30,305,656	5,597,276	9,452,022	31.18	2	2,231,262	0.236
1911	31,183,968	.....	10,320,074	33.10	2	2,633,155	0.255
1912	33,324,808	.....	10,946,739	32.84	1	2,974,429	0.277
To'ls	550,106,114	.....	186,018,035	33.82	.....	$83,305,726	0.448

PRODUCTION AND VALUE OF SALT IN MICHIGAN BY GRADES, 1906-1912.

Year.	Table and dairy.		Common fine.		Common coarse.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		Barrels.		Barrels.	
1906	509,905	$362,368	2,927,478	$757,470	2,021,287	$618,727
1907	657,509	392,641	3,601,270	914,154	1,743,840	471,378
1908	584,452	620,647	3,454,062	968,617	2,020,956	610,286
1909	585,370	732,907	3,530,303	1,125,095	2,103,719	647,878
1910	798,434	565,653	2,216,181	734,828	1,992,465	596,301
1911	817,486	742,702	2,362,075	698,203	2,070,745	745,720
1912	905,593	920,782	2,225,337	645,692	2,086,492	835,673

Year.	Packers.		Other, rock, etc.		Brine and other.*	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		Barrels.		Barrels.	
1906	91,098	$33,733	.....	.....	4,387,043	$246,462
1907	119,459	48,455	.....	.....	4,664,552	235,729
1908	134,726	53,669	.....	.....	3,991,083	205,084
1909	93,357	3,983	.....	.....	3,648,395	185,051
1910	92,426	43,942	.....	.....	4,104,934	211,317
1911	105,401	45,421	576,595	$181,865	4,387,772	219,244
1912	223,866	84,638	763,908	250,680	4,737,038	236,852

Total.	Total.	
	Quantity.	Value.
	Barrels.	
1906	9,936,802	$2,018,760
1907	10,786,630	2,062,357
1908	10,194,270	2,458,303
1909	9,966,744	2,732,556
1910	9,452,022	2,231,262
1911	10,320,074	2,633,155
1912	10,946,739	2,974,429

*Brine only after 1910.

PRODUCTION OF SALT IN MICHIGAN BY COUNTIES FOR 1912.

County.	Table and dairy.		Common fine.		Common coarse.		Packers.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quant.	Value.
	Barrels.		Barrels.		Barrels.		Barrels.	
Bay, Isabella, Mason, Midl'd.	38,009	$57,014	1,327,112	$383,337	1,425,732	$559,493	36,510	$20,434
Saginaw	.....	.....	.....	.....	275,146	116,270	13,040	6,674
St. Clair	718,284	785,740	382,088	140,662	159,136	68,999	165,911	53,761
Wayne	149,300	78,028	516,137	121,693	226,478	90,911	8,405	3,769
State total	905,593	$920,782	2,225,337	$645,692	2,086,492	$835,673	223,866	$84,638

County.	Other grades and rock salt.		Brine.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		Barrels.		Barrels.	
Bay, Isabella, Mason, Midland	48,284	$9,608	4,505	$112	2,880,152	$1,029,998
Saginaw	1,185	355	.....	.....	289,371	123,299
St. Clair	18,156	5,229	.....	.....	1,443,575	1,054,391
Wayne	696,283	235,488	4,737,038	236,852	6,333,641	766,741
State total	763,908	$250,680	4,741,543	$236,964	10,946,739	$2,974,429

ANNUAL PRODUCTION OF BRICK AND TILE PRODUCTS IN MICHIGAN, 1899-1912.

Year.	Common brick.		Average price per M.	Front brick.		Average price per M.	Vitrified brick.		Average price per M.	Fancy or ornamental brick.	Fire brick.		Average price per M.
	Quantity.	Value.		Quantity.	Value.		Quantity.	Value.			Quantity.	Value.	
1899	200,144,000	933,176	$4 66	4,290,000	58,920	$13 73	a	a	.....	.....	.....	.....	.....
1900	180,892,000	863,250	4 77	8,421,000	48,411	5 75	a	a	$12 42	.....	.....	.....	.....
1901	215,836,000	1,095,254	5 07	9,476,000	64,031	6 76	a	a	12 30	.....	.....	.....	.....
1902	237,254,000	1,331,752	5 61	5,684,000	42,792	7 53	a	a	12 26	.....	.....	.....	.....
1903	215,791,000	1,251,572	5 80	2,225,000	19,000	8 54	a	a	13 27	.....	.....	.....	.....
1904	205,196,000	1,116,714	5 44	1,080,000	7,500	6 94	a	a	13 28	.....	.....	.....	$13 00
1905	211,558,000	1,152,505	5 45	693,000	5,995	8 65	6,112,000	81,706	13 37	.....	.....	.....	19 37
1906	206,583,000	1,178,202	5 70	1,474,000	14,162	9 61	6,229,000	81,814	13 13	.....	.....	.....	10 05
1907	200,817,000	1,181,015	5 88	3,956,000	32,116	8 12	7,911,000	94,601	11 96	.....	.....	.....	12 00
1908	181,049,000	994,525	5 49	1,896,000	19,496	10 28	6,165,000	76,630	12 43	.....	.....	.....	.....
1909	219,820,000	1,250,787	5 69	2,379,000	18,654	7 84	10,473,000	129,283	12 34	.....	.....	.....	.....
1910	232,551,000	1,363,316	5 86	2,209,000	27,533	12 46	9,080,000	116,446	12 82	.....	.....	.....	.....
1911	252,465,000	1,301,998	.....	2,498,000	31,572	.....	5,597,000	78,336	.....	.....	.....	.....	.....
1912	271,189,000	1,592,283	.....	3,934,000	41,476	.....	6,600,000	92,000	.....	.....	a	a	.....
Totals.	3,031,145,000	16,606,349	.....	50,215,000	431,658	.....	58,167,000	750,816	.....	.....	.....	.....	.....

a Concealed, less than three producers.

ANNUAL PRODUCTION OF BRICK AND TILE PRODUCTS IN MICHIGAN, 1899-1912.—*Concluded.*

Year.	Stove linings.	Drain tile.		Sewer pipe.	Fire-proofing.	Tile (not drain).	Miscellaneous.	Hollow building tile or blocks.	Per cent of total product in U. S.	Rank of state.	No. of firms operating.	Total value.
	Value.	Quantity.	Value.	Value.	Value.	Value.	Value.					
1899	.....	.....	140,171	50,300	5,900	.....	22,709	.....	1.68	13	196	1,254,256
1900	.....	.....	114,747	57,916	2,350	.....	406	.....	1.50	17	189	1,147,378
1901	.....	.....	98,972	a	1,880	.....	637	.....	1.71	14	180	1,497,169
1902	.....	.....	96,645	a	3,290	.....	.....	.....	1.69	13	182	1,660,942
1903	.....	.....	129,028	a	.....	.....	.....	19,138	1.58	14	178	1,662,414
1904	.....	.....	208,088	a	.....	.....	.....	8,080	1.58	14	168	1,670,892
1905	.....	.....	205,445	a	a	.....	.....	3,585	1.41	16	154	1,719,746
1906	.....	.....	314,098	a	.....	.....	.....	4,290	1.38	16	142	1,793,367
1907	.....	.....	289,868	a	.....	.....	1,500	6,386	1.39	17	136	1,786,190
1908	.....	.....	327,630	a	4,100	.....	40,100	.....	1.54	16	132	1,666,381
1909	.....	.....	364,006	a	a	.....	66,128	.....	1.44	16	122	1,947,059
1910	.....	.....	348,205	a	.....	.....	a	.....	1.53	15	118	2,083,525
1911	3,971	.....	313,072	a	a	a	228,530	a	.....	.....	.....	1,953,442
1912	a	.....	387,945	a	1,461	a	235,459	a	.....	.....	.....	2,350,606
Totals	.....	.....	3,337,920	.....	.....	.....	.....	.....	.....	.....	.....	24,193,367

a Concealed under miscellaneous, less than three producers.

VALUE OF THE PRODUCTION OF LIMESTONE IN MICHIGAN, 1899-1912.

Year.	Rough building. Value.	Dressed building. Value.	Paving. Value.	Curbing. Value.	Flagging. Value.	Rubble. Value.	Riprap. Value.	Crushed stone.		
								Road making. Value.	Railroad ballast. Value.	Concrete. Value.
1899	30,299	a	62,815	.....	.....	.....	1,111	.....	.....	.....
1900	32,362	a	105,266	.....	.....	.....	799	.....	.....	.....
1901	47,785	a	.....	b	380	5,098	c	31,605	18,200	75,643
1902	58,707	a	.....	489	200	3,101	5,740	56,261	40,810	49,430
1903	36,528	a	49,000	250	5,150	710	800	61,342	35,340	48,504
1904	32,941	805	37,665	.....	.....	2,800	2,405	58,655	57,100	60,745
1905	17,071	.....	.....	160	.....	744	1,568	112,113	43,649	107,396
1906	9,368	641	90,723	75	.....	4,654	1,204	78,437	103,442	61,852
1907	15,120	100	56,500	.....	.....	1,433	1,234	131,708	46,516	97,762
1908	7,276	.....	10,825	300	100	15,907	1,574	182,510	33,900	73,200
1909	4,450	7,445	.....	.....	.....	1,572	3,615	132,902	42,445	112,829
1910	3,552	.....	35,500	.....	.....	2,205	908	110,184	42,358	178,318
1911	7,526	.....	.....	.....	.....	165	380	113,574	34,998	137,285
1912	9,997	.....	.....	.....	.....	380	75	295,449	28,368	97,298
Total	312,982	.....	448,294	.....	5,730	38,769	21,413	1,364,740	527,126	1,100,262

a Included under rough building.
b Included under flagging.
c Included under rubble.

VALUE OF THE PRODUCTION OF LIMESTONE IN MICHIGAN, 1899–1912.—*Concluded.*

Year.	Flux. Value.	Sugar factories. Value.	To chemical plants. Value.	To paper mills. Value.	For agricultural purposes. Value.	Sold to lime burners. Value.	Other. Value.	Total. Value.
1899	27,512	.....	.....	.....	.....	157,657	2,375	281,769
1900	3,200	.....	.....	.....	.....	65,000	124,220	330,847
1901	13,488	.....	.....	.....	.....	136,173	101,399	429,771
1902	32,246	.....	.....	.....	.....	98,000	68,164	413,148
1903	15,502	.....	.....	.....	.....	132,600	4,747	390,473
1904	62,586	.....	.....	.....	.....	180,683	5,323	501,708
1905	109,883	.....	.....	.....	.....	9,380	142,790	544,754
1906	81,517	224,356	.....	.....	.....	.....	.....	656,269
1907	109,429	22,234	.....	.....	.....	.....	278,297	760,333
1908	56,841	32,594	.....	.....	.....	.....	253,990	669,017
1909	91,915	25,845	.....	.....	.....	.....	327,571	750,589
1910	100,149	69,647	.....	.....	.....	.....	299,305	842,126
1911	186,046	65,141	a	12,558	3,003	.....	440,857	1,005,751
1912	137,812	36,944	508,044	8,150	3,447	.....	13,596	1,139,560
Total	1,028,126	476,761	508,044	20,708	6,450	779,493	2,094,010	8,716,115

a Included under other value.

PRODUCTION AND VALUE OF SAND AND GRAVEL IN MICHIGAN, 1904-1912.

Year.	Glass sand.		Molding sand.		Building sand.		Fire sand.		Engine sand.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		Tons.		Tons.		Tons.		Tons.	
1903	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1904	.....	.....	167,147	76,299	69,656	30,898	.....	.....	.....	.....
1905	.....	.....	19,382	13,247	263,315	148 065	5,000	2,500	.....	.....
1906	600	3,000	61,387	26,108	403,199	127,937	.....	.....	4,000	400
1907	4,300	8,600	54,172	24,190	451,646	157,150	6,000	3,000	1,534	153
1908	17,000	34,000	4,584	2,892	474,238	228,395	.....	.....	1,991	319
1909	65,000	79,000	53,226	20,756	1,090,419	327,247	4,000	2,000	12,415	1,493
1910	16,212	25,675	93,812	24,004	1,151,588	334,336	5,000	3,000	22,270	2,172
1911	a	a	68,878	17,901	833,729	247,997	a	a	25,392	4,447
1912	a	a	152,433	40,145	902,556	294,115	.....	.....	18.575	4,774
Totals	.....	.....	675,021	245,542	5,640,346	1,896,140	.....	.....	86,177	13,758

PRODUCTION AND VALUE OF SAND AND GRAVEL IN MICHIGAN, 1904-1912.

Year.	Furnace sand.		Paving sand.		Other sand.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		Tons.		Tons.	
1903	.....	.....	.....	.....	.....	.....
1904	.....	.....	.....	.....	.....	.....
1905	.....	.....	.....	.....	50,187	14,476
1906	5,000	2,500	.....	.....	51,005	12,140
1907	3,858	3,133	.....	.....	173,724	12,187
1908	3,329	3,828	.....	.....	29,187	6,850
1909	3,183	3,660	.....	.....	295,612	50,953
1910	3,185	4,924	.....	.....	372,880	57,385
1911	a	a	152,144	29,650	114,801	52,005
1912	.....	.....	68,453	16,898	130,624	54,746
Totals	.....	.....	220,597	46,548	1,218,020	260,742

Year.	Gravel.		Total.	
	Quantity.	Value.	Quantity.	Value.
	Tons.		Tons.	
1903	.....	.....	.....	.....
1904	.....	.....	236,803	107,197
1905	76,625	32,321	414,509	210,609
1906	72,598	25,614	597,789	197,699
1907	329,407	81,182	1,024,641	289,595
1908	312,262	94,081	842,591	370,365
1909	695,902	200,523	2,219,757	685,632
1910	1,197,791	364,841	2,862,738	816,337
1911	935,072	203,218	2,185,165	565,969
1912	1,409,180	407,925	2,681.821	818,603
Total	5,028,837	1,409,705	13,065,814	4,062,006

a Included under other sand.

TABLE SHOWING PRODUCTION OF GYPSUM IN MICHIGAN.

Year.	Ground into land plaster. Tons.	Gypsum calcined into plaster. Tons.	Sold crude. Tons.	Total production. Tons.	Total value.
Before 1868	132,043	14,285	.....	146,328	$671,022
1868	28,837	6,244	.....	35,081	165,298
1869	29,996	7,355	.....	37,351	178,824
1870	31,437	8,246	.....	39,683	191,718
1871	41,126	8,694	.....	49,820	234,054
1872	43,536	10,673	.....	54,209	259,524
1873	44,972	14,724	.....	59,696	297,678
1874	39,126	14,723	.....	53,849	274,284
1875	27,019	10,914	.....	37,933	195,386
1876	39,131	11,498	.....	50,629	248,504
1877	40,000	9,819	.....	49,819	238,550
1878	40,000	8,634	.....	48,634	229,070
1879	43,658	9,070	.....	52,728	247,192
1880	49,570	18,929	.....	68,499	349,710
1881	33,178	20,145	.....	53,323	293,872
1882	37,821	24,136	.....	61,957	344,374
1883	40,082	28,410	.....	68,492	377,567
1884	27,888	27,959	.....	55,847	335,382
1885	28,184	25,281	.....	53,465	286,802
1886	29,373	27,370	.....	56,748	308,094
1887	28,794	30,376	.....	59,170	329,392
1888	22,177	35,125	.....	57,302	347,531
1889	19,823	36,800	.....	56,623	353,869
1890	12,714	47,163	15,000	74,877	192,099
1891	15,100	53,600	11,000	97,700	223,725
1892	14,458	77,599	47,500	139,557	306,527
1893	16,263	77,327	31,000	124,590	303,921
1894	11,982	47,976	20,000	79,958	189,620
1895	9,003	51,028	6,488	66,519	174,007
1896	6,582	60,352	700	67,634	146,424
1897	7,193	71,680	16,001	94,874	193,576
1898	13,345	77,852	1,984	93,181	204,310
1899	17,196	88,315	39,266	144,776	283,537
1900	10,354	86,972	33,328	129,654	285,119
1901	9,808	129,256	46,086	185,150	267,243
1902	13,022	158,320	68,885	240,227	459,621
1903	18,409	198,119	52,565	269,093	700,912
1904	18,294	185,422	34,669	238,385	541,197
1905	20,285	203,313	24,284	247,882	634,434
1906	30,220	208,715	27,517	341,716	753,878
1907	15,500	197,666	36,543	317,261	681,351
1908	11,414	192,403	40,324	327,810	491,928
1909	11,890	344,171	45,781	394 907	1,213,347
1910	7,097	240,905	64,566	357,174	667,199
1911	15,548	206,299	79,050	347,296	523,926
1912	10,103	243,656	63,819	384,297	621,547
Totals	1,213,551	3,657,519	806,356	6,077,674	16,817,145

PRODUCTION OF GYPSUM IN MICHIGAN 1911-1912.

Year.	Crude gypsum mined.	Gypsum sold crude.							
		To Portland Cement Mills.		As land plaster.		For other purposes.		Total sold crude.	
	Quantity.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		Bbls.		Bbls.		Bbls.		Bbls.	
1911	347,296	63,489	69,497	15,548	15,706	13	52	79,050	85,255
1912	384,297	53,711	52,420	10,103	9,375	5	50	63,819	61,845

Year.	Gypsum sold calcined.									
	As mixed with wall plaster.		As plaster of Paris, etc.		As stucco.		As dental plaster.		To plate glass works.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Bbls.		Bbls.		Bbls.		Bbls.		Bbls.	
1911	146,920	$381,362	47,989	$88,168	.....	.....	20	$110	11,370	$19,031
1912	146,099	368,676	937	3,229	82,010	$168,734	3	12	6,214	8,078

PRODUCTION OF GYPSUM IN MICHIGAN, 1911-1912.—*Concluded.*

Year.	Gypsum sold calcined.				Total value.	Kettles in mill.		Daily capacity of mill.	Shifts run by mill during year.		No. mines.	No. mills.
	For other purposes.		Total sold calcined.									
	Quantity.	Value.	Quantity.	Value.		No.	Size.	24 hrs.	Total No.	Hrs. in shift.		
	Bbls.		Bbls.					Tons.				
1911.....	.....	.....	206,299	488,671	573,926	29	8 x 10	2,200+	.....	.....	8	8
1912.....	8,393	10,973	243,656	559,702	621,547	28	8 x 10	2,140	1,850	11	6	8

ANNUAL PRODUCTION AND VALUE OF SAND-LIME BRICK IN MICHIGAN, 1904-1912

Year.	Number of operating plants.	Common brick.		Front brick		Fancy brick		Total value.
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
1904	10	9,886,000	64,034	580,000	5,234	19,000*	497	69,765
1905	12	24,841,000	155,883	1,577,000	12,893	24,000*	526	169,302
1906	11	27,281,000	162,879	1,796,000	12,022	700*	20	174,921
1907	13	25,488,000	158,606	2,000,000*	14,234	.....	.....	172,840
1908	10	21,997,000	131,827	900,000*	6,982	.....	.....	138,809
1909	11	34,217,000	207,082	1,600,000*	11,144	.....	.....	218,226
1910	10	37,648,337	218,627	3,255,890	22,022	.....	.....	240,649
1911	10	32,889,000	192,224	2,726,000	17,777	.....	.....	210,001
1912	11	48,129,000	307,106	1,163,000	9,626	.....	.....	316,732
Grand total		262,376,337	1,598,268	15,597,890	111,934	43,700	1,043	1,711,245

*Estimated.

PRODUCTION AND VALUE OF LIME IN MICHIGAN, 1904-1912.

Year.	Total lime burned.		Average price per ton.	No. of plants operating.	Rank of state. Production.
	Quantity, tons.	Value.			
1904	63,601	256,955	$4 04	.....	.....
1905	48,089	192,844	4 01	.....	.....
1906	68,133	281,465	4 13	13	.....
1907	65,822	276,534	4 20	12	.....
1908	68,050	282,023	4 14	10	15
1909	83,108	354,135	4 26	12	13
1910	72,345	303,377	4 19	10	14
1911	80,709	352,608	4 37	14	14
1912	74,720	311,448	4 17	11	16
Total	624,577	2,611,389	.....	.....	.....

VALUE OF THE PRODUCTION OF POTTERY IN MICHIGAN, 1899-1912.

Year.	Rank of state.	Firms.	Red earthenware value.	Porcelain electrical supplies value.	C. C. ware value.	Miscellaneous value.	Total value	Per cent of total product in U. S.
1899	18	4	29,641		100		29,741	.17
1900	17	4	34,317				34,317	.17
1901	16	5	42,465			2,400	44,865	.20
1902	14	4	44,098			39,000	83,098	.41
1903	19	4	42,007			6,000	48,007	.19
1904			40,621			3,000	43,621	
1905	17	5	a		a	7,000	45,961	.16
1906	17	6	43,510			7,600	51,110	.16
1907	16	6	54,474			7,100	61,574	.20
1908	16	6	54,659			7,750	62,409	.25
1909	13	5	60,939			34,500	95,439	.31
1910	13	6	90,450	a		13,300	112,607	.33
1911	13	6	80,580	a	a	a	130,490	.38
1912	10	6	99,555	a		a	194,892	
Totals							1,038,221	

a Included in the total.

OUTPUT OF MINERAL WATERS IN MICHIGAN, 1900–1912.

Year.	No. of springs.	Total.		Medicinal Value.	Table Value.	Price per gal.
		Quantity. gal.	Value.			
1900	28	3,398,996	411,935	.....	.....	.....
1901	28	7,019,168	1,195,614	.....	.....	.....
1902	28	8,653,600	275,763	.....	.....	.....
1903	19	6,919,107	200,668	.....	.....	.....
1904	19	3,385,675	118,422	.....	.....	.....
1905	17	2,684,800	277,188	38,900	238,288	$.10
1906	19	902,528	73,357	.....	.....	.....
1907	19	1,472,679	127,133	35,091	92,042	.09
1908	24	2,004,433	88,910	5,995	82,915	.04
1909	19	2,760,604	104,454	6,099	98,355	.04
1910	17	1,454,020	69,538	100	69,438	.05
1911	23	1,713,401	72,253	12,156	60,097	.04
1912	17	1,420,465	75,611	777	74,834	.053
Total	.....	43,789,566	3,090,846	93,118	715,969	.....

PRODUCTION OF TRAP ROCK IN MICHIGAN, 1911-1912.

Year.	No. of producers.	Crushed stone.				Riprap. value.	Total value.
		Road making.		Concrete.			
		Quantity.	Value.	Quantity.	Value.		
		Tons.		Tons.			
1911	3	.....	.....	45,250	$38,429	.....	$51,000
1912	5	21,805	$18,366	11,355	9,340	$8,500	36,206
Total	.....	21,805	$18,366	56,605	$47,769	$8,500	$87,206

*VALUE OF THE PRODUCTION OF SANDSTONE IN MICHIGAN 1899-1912

Year.	Rough building. Value.	Dressed building. Value.	Curbing. Value.	Flagging. Value.	Rubble. Value.	Riprap. Value.	Crushed stone: Road making. Value.	Crushed stone: Concrete Value.	Other. Value.	Total value.
1899	102,447	51,682	109	a					23,800	178,038
1900	73,850	58,800								132,650
1901	128,909				26,519	b			19,000	174,428
1902	136,280	23,600			27,393	800				188,073
1903	89,931	10,365			15,554		2,050	3,450		121,350
1904	47,593	14,818			10,657		1,400	400		74,868
1905	64,056	36,035			10,332				12,700	123,123
1906	35,272	18,950			10,403	770				65,395
1907	33,561	10,918		528	7,900	96				53,003
1908	15,100	18,813			5,190					39,103
1909	12,985	16,805			6,294					36,084
1910	13,312	15,416			2,505					31,233
1911	5,682	2,809			3,068	1,140			286	12,985
1912	c	c			c	c			a	16,438
Totals	758,978	279,011	109		125,815		3,450	3,850	55,786	1,246,771

a Included under curbing.
b Included under rubble.
c Included in total.
* Exclusive of sandstone made into grindstones and whetstones.

PRODUCTION OF CLAY IN MICHIGAN, 1910-1912.

Year.	Slip clay.		Brick clay.		Miscellaneous clay.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		Tons.		Tons.		Tons.	
1910	1,363	$3,889	60	$105	1	$400	1,424	$4,394
1911	1,744	5,090	18	32	2	150	1,764	5,272
1912	2,034	6,164	.....	.....	9	9	2,043	6,173
Total.	5,141	$15,143	78	$137	12	$559	5,231	15,839

PRODUCTION OF NATURAL GAS IN MICHIGAN, 1911-1912.

Year.	No. of producers.	Domestic.		Industrial.		Other.		Total.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
		M. cu. ft.		M. cu. ft.		M. cu. ft.		M. cu. ft.	
1911	22	930	$930	.....	.....	800	$400	1,730	$1,330
1912	17	.....	1,020	900	$450	.....	.....	900	1,470
Total.	.....	930	$1,950	900	$450	800	$400	2,630	$2,800

SUMMARY TABLE OF THE PRODUCTION AND VALUE OF THE MINERAL PRODUCTS IN MICHIGAN FOR 1912.

	Quantity.	Value.
Copper, pounds	231,112,228	$35,992,837
Iron ore, long tons	12,649,296	28,862,818
Pig iron sold, long tons	459,975	6,579,048
Portland cement, barrels	3,651,094	3,145,001
*Salt, barrels	10,946,739	2,974,429
Brick and tile products, number of brick	281,741,000	2,350,606
Coal, tons	1,164,973	2,203,808
Coke	.....	a
Limestone	.....	1,139,560
Sand and gravel, tons	2,681,821	818,603
Gypsum and gypsum products, tons	384,297	621,547
Silver—fine, ounces	528,453	324,999
Sand lime brick	49,292,000	316,732
Lime, tons	74,720	311,448
Pottery	.....	194,892
Mineral paints	.....	a
Grindstones	.....	a
Bromine	.....	a
Mineral water, gallons	1,420,465	75,611
Calcium chloride	.....	a
Trap rock, tons, exclusive of riprap	33,160	36,206
Graphite	.....	a
Sandstone	.....	16,438
Quartz	.....	a
Scythestones	.....	a
Clay, tons	2,043	6,173
Natural gas, M. cu. ft.	900	1,470
Petroleum	.....	a
Miscellaneous	.....	2,088,197
Total	.....	$88,076,861

*Includes rock salt but not bromine or calcium chloride.
a Included under miscellaneous.

BLAST FURNACES IN MICHIGAN.

Name of furnace.	Name of company.	Location of furnace.	Activity.	Type of fuel.	Activity of furnace.
Antrim	Antrim Iron Company	Antrim	In blast	Charcoal	115 tons
Cadillac	Mitchell-Diggins Iron Co	Cadillac	In blast	Charcoal	100 tons
Carp	Pioneer Iron Company	Near Marquette	Idle	Charcoal	50 tons
Chocolay	Lake Superior Iron & Chemical Co	Harvey	Idle	Charcoal	70 tons
Detroit	Detroit Furnace Company	Detroit	Idle	Coke	75 tons
East Jordan	East Jordan Furance Company	East Jordan	In blast	Charcoal	80 tons
Elk Rapids	Lake Superior Iron & Chemical Co	Elk Rapids	Idle	Charcoal	110 tons
Gladstone	Pioneer Iron Company	Gladstone	In blast	Charcoal	.....
Manistique	Lake Superior Iron & Chemical Co	Manistique	Idle	Charcoal	110 tons
Marquette	Pioneer Iron Company	Marquette	In blast	Charcoal	120 tons
Newberry	Lake Superior Iron & Chemical Co	Newberry	Idle	Charcoal	80 tons
Pine Lake	Lake Superior Iron & Chemical Co	Boyne City	In blast	Charcoal	110 tons
Spring Lake	Spring Lake Iron Company	Fruitport	Idle	Charcoal	75 tons
Stevenson	Stevenson Charcoal Iron Co	Wells	In blast	Charcoal	80 tons
Zug Island A	Detroit Iron & Steel Company	Detroit	In blast	Coke	300 tons
Zug Island B	Detroit Iron & Steel Company	Detroit	In blast	Coke	325 tons

MINERAL PRODUCTS OF MICHIGAN.

CEMENT PRODUCERS, 1912.

Operators.	Office.	Works.
Alpena Portland Cement Co	Alpena	Alpena.
Huron Portland Cement Co	1525 Ford Bldg., Detroit	Alpena.
The Hecla Co	Penobscot Bldg., Detroit	Bay City.
Burt Portland Cement Co	Bellevue	Bellevue.
Chanute Cement & Clay Product Co	Bronson	Bronson.
Peninsular Portland Cement Co	Cooley Block, Jackson	Cement City.
Michigan Portland Cement Co	Chelsea	Chelsea.
Wolverine Portland Cement Co	Coldwater	Coldwater and Quincy.
New Aetna Portland Cement Co	412 Union Trust Bldg., Detroit	Fenton.
Egyptian Portland Cement Co	712 Union Trust Bldg., Detroit	Fenton.
Logan Portland Cement Co	Fenton	Fenton.
Omega Portland Cement Co	Jonesville	Mosherville.
Newaygo Portland Cement Co	Grand Rapids	Newaygo.
Elk Cement & Lime Co	Elk Rapids	Elk Rapids.
Peerless Portland Cement Co	Union City	Union City.
Wyandotte Portland Cement Co	1525 Ford Bldg., Detroit	Wyandotte.

SALT PRODUCERS, 1912.

Operators.	Office.	Works.
Bay County:		
The Mershon-Bacon Co	Bay City	Bay City.
Hine & Co	Sta. A, Bay City, W. S.	West Bay City.
Isabella County:		
Peter Van Schaack & Sons	140 Lake Street, Chicago, Ill.	Mt. Pleasant.
Manistee County:		
The R. G. Peters Salt and Lumber Co	Care of Michigan Trust Co., Receiver, East Lake	East Lake.
Filer & Sons, Vacuum Pan Salt Works	Filer City	Filer City.
The Buckley & Douglass Lumber Co	381 River St., Manistee	Manistee.
Manistee Salt Co		
Geo. I. Hicks Jas. I. Ennis Jos. E. Fitch	Manistee, (or Chicago, Ill.)	Manistee.
Louis Sands Salt and Lumber Co	Manistee	Manistee. (Reitz & River Street Plants.)
Mason County:		
Anchor Salt Co., C. S. Ostrom, Auditor	Ludington	Ludington.
The Stearns Salt & Lumber Co	Wash'n Ave., Ludington	Ludington.
Midland County:		
The Dow Chemical Co., Hubert H. Dow, G. M. (Also Bromine.)	Midland	Midland and Mt. Pleasant (Isabella Co.)
Saginaw County:		
Mershon, Eddy, Parker & Co	Saginaw	Carrollton.
Bliss & Van Auken	Saginaw, W. S.	Saginaw.
S. L. Eastman Flooring Co	Saginaw, W. S.	Saginaw.
Edward Germain	Holland Ave., near Genesee, Saginaw	Saginaw.
Saginaw Plate Glass Co., E. F. Ackard, Mgr. (Also Calcium Chloride)	Saginaw, W. S.	Saginaw.
Saginaw Salt Co., Chas. Coryell	430 Shearer Bldg., Bay City	St. Charles.
St. Clair County:		
Crystal Flake Salt Co., A. F. Hunger	Marine City	Marine City.
Davidson-Wonsey Co	Marine City	Marine City.
Michigan Salt Works, S. C. McLouth, Sec.-Treas	Marine City	Marine City.
Port Huron Salt Co., Sterling Morton	717 Ry. Exchange, Chicago, Ill., Port Huron	Port Huron and St. Clair.
Diamond Crystal Salt Co., V. N. Whitney	St. Clair	St. Clair.
Walton Salt Works	720 Hammond Bldg. Detroit	(Mich. M. I.)
Wayne County:		
Delray Salt Co., A. A. Nelson, Mgr	Detroit	Delray.
Solvay Process Co	Syracuse, N. Y.	Delray.
Detroit Salt Co	406 Moffat Bldg, Detroit	Detroit.
Mulkey Salt Co	Detroit	Detroit.
Peninsular Salt Co	Ecorse	Ecorse.
Worcester Salt Co	168 Duane St., New York City	Ecorse.
Michigan Alkali Co., Jno. M. Griffith, Aud'r.	Wyandotte	Wyandotte.
Morton Salt Co	Wyandotte	Wyandotte.
Pennsylvania Salt Mfg. Co	115 Chestnut St., Philadelphia, Pa	Wyandotte.

BRICK AND TILE MANUFACTURERS, 1912.

Operators.	Office.	Works.
Alger County:		
Nathaniel Lobb	Munising	Hallston.
Allegan County:		
Allegan Brick Works, Fidus E. Fish & Son Props	Allegan	Allegan.
L. Y. Cady	289 Thomas St., Allegan	Allegan.
Zeeland Brick Co	Zeeland	Hamilton (also in Barry, Kalamazoo and Ottawa Cos.)
Alpena County:		
Richard Collins	151 Water St., Alpena	Alpena.
Michigan Enameled Brick & Tile Co	Alpena, Mich	Alpena.
Arenac County:		
Michigan Paving Brick Co., J. S. Deitrich, Sec	Saginaw	Omer.
M. K. Perlberg	Standish	Standish.
Cook Brick & Tile Co., S. B. Cook, Mgr	Harrisville	Twining.
Barry County:		
Zeeland Brick Co	Zeeland	Cloverdale, also in Allegan Kalamazoo & Ottawa Cos.
Wm. Leonard	Delton	Delton.
Bay County:		
Michigan Vitrified Brick Co	Bay City	Bay City.
Berrien County:		
Benton Harbor Brick & Tile	Benton Harbor	Benton Harbor.
Branch County:		
Lorenzo D. Reynolds & Son	Quincy	Algansee.
Charlevoix County:		
Boyne City Brick Co., W. S. Shaw, Prop	Boyne City	Boyne City.
Northern Brick Co., Inc., L. A. Moon, Sec	Boyne Falls	Boyne Falls.
Price Brick Co., Harry S. Price, Prop	East Jordan	East Jordan.
Chippewa County:		
Rudyard Brick Works, Thornton Bros. Brick Co	Rudyard	Rudyard.
Clinton County:		
C. F. Pulfrey	St. Johns	St. Johns.
Dickinson County:		
Vulcan Brick Works, W. J. Turner, Prop	Vulcan	Vulcan.
Eaton County:		
American Sewer Pipe Co	Broad St., Akron, Ohio	Grand Ledge.
Grand Ledge Clay Product Co	Grand Ledge	Grand Ledge.
Emmet County:		
C. A. De Arment	Petoskey	Petoskey.
Genesee County:		
Gale Bros	Atlas	Atlas.
Thomas Oliff	Clio	Clio.
Uptegraff Bros. & Co	Davison	Davison.
Duffield Brick & Tile Wks., John J. Middlesworth, Prop	Duffield	Duffield.
Haas & McCann, Fredk. W. McCann	Gaines	Gaines.
Brick & Drain Tile Co	Grand Blanc	Grand Blanc.
Otter Lake Brick & Tile Co., Stewart & Kerby	Otter Lake	Otter Lake.
Frank Sharp	R. D. No. 1, Linden	South Mundy.
Gladwin County:		
Christ Korkoske	Gladwin	Gladwin.
Grand Traverse County:		
Traverse City Brick Co	Traverse City	Keystone.

BRICK AND TILE MANUFACTURERS, 1912.—*Continued.*

Operators.	Office.	Works.
Gratiot County:		
Ashley Tile Co., Wm. Fictehenbiner	Ithaca	Ashley.
David Stevenson & Sons	Ashley	Ashley.
Ithaca Brick & Tile Yards, Redman & Thomas, Props	Ithaca	Ithaca.
Batroff & Snyder	Ithaca	North Star.
C. D. Peet	North Star	North Star.
W. H. H. Smith & Son	St. Louis	St. Louis.
Riverside Brick & Tile Co., R. E. Duffield Bros	Sumner	Sumner.
Hillsdale County:		
Lee Wade	Jerome	Jerome.
J. B. Keiser & Son	Prattville	Prattville.
Conley & Gish	Waldron	Waldron.
Huron County:		
Wyers & O'Connell	Ubly	Ubly.
John Lecht	Warren	Elkton.
Ernst Reinhold	Sebewaing	Sebewaing.
Ingham County:		
Clippert, Spaulding & Co	Michigan Ave., Lansing	Lansing.
Ionia County:		
Albert Brown	Saranac	Saranac.
Fred H. Van Der Heyden	Ionia	Ionia.
Isabella County:		
Kane Bros	Mt. Pleasant	Mt. Pleasant.
T. Thompson & Son, W. J. Thompson	Mt. Pleasant	Mt. Pleasant.
Jackson County:		
American Sewer Pipe Co	Broad St., Akron, Ohio	Jackson, also in Eaton Co., and in Ind., Ohio, Pa. and W. Va.
Nathan F. Simpson, Warden, Michigan State Prison	Jackson	Jackson.
Kalamazoo County:		
Zeeland Brick Co	Zeeland	Brownell also in Ottawa, Barry and Allegan Cos.
Manager, Brick Works	Williams	Williams.
Kent County:		
Grand Rapids Brick Co., W. J. Clark, Secy	Michigan Ave & Fuller St. Grand Rapids	Grand Rapids.
Sparta Clay Works, H. B. Fox, Prop	Sparta	Sparta.
Leelanau County:		
James W. Markham	Traverse City, R. F. D. 5	Traverse City.
Lenawee County:		
Laurenson & Saunders	Addison	Addison.
B. O. Newell	Jackson	Addison Junc.
C. H. Wilt	Blissfield	Blissfield.
Britton Pressed Brick Co	216 E. Washington St. Ann Arbor	Britton.
Wm. T. Atkin	Deerfield	Deerfield.
Jasper Brick & Tile Co., B. F. Woodford & Son, Props	Jasper	Jasper.
G. D. Ellis	Macon	Macon.
American Brick & Tile Co., Edward D. Clark, Pres	Morenci	Morenci.
Morenci Brick & Tile Wks., L. V. Lee, Prop.	Morenci	Morenci.
Saxton Brick & Tile Wks., J. S. Saxton & Son, Props	Blissfield, R. D. No. 2	Riga.
Albert A. Confort	Tecumseh, R. D	Tecumseh.
Mackinac County:		
Northern Michigan Brick & Tile Co	St. Ignace	Reavie.

BRICK AND TILE MANUFACTURERS, 1912.—*Continued.*

Operators.	Office.	Works.
Macomb County:		
Jacob Hartsig	Warren	Centerline.
Frank G. Hacker	Mt. Clemens	Clinton.
East Gass	Washington, R. D. No. 2	Davis.
Mt. Clemens Brick & Tile Co., Fred B. Schott, Pres	Mt. Clemens	Mt. Clemens.
Warren Brick & Tile Works, Schulte, Hennes & Evans, Props., C. O. Evans, Mgr	Warren (or Detroit)	Warren.
Manistee County:		
Joseph Kujawske	Oakhill (or Filer City)	Oakhill.
Marquette County:		
Shaw Brick Works, George W. Shaw, Prop	Marquette	Shaw.
Mason County:		
A. A. Keiser	105 Ludington Ave., Ludington	Ludington.
Mecosta County:		
Wm. F. Nehmer	Milton Ave., Big Rapids.	Big Rapids.
Midland County:		
Midland Brick & Tile Co., Olmstead & Ryal, Props	Midland	Midland.
Missaukee County:		
J. A. Smith	Cadillac	McBain.
Monroe County:		
Meyers Bros	Azalia	Azalia.
Linenfelser Brick & Tile Co., Fred Linenfelser	Maybee	Maybee.
John Strong & Son	South Rockwood	South Rockwood
Gerhard Rehn	Strasburg	Strasburg.
Muskegon County:		
Holton Brick Co., P. J. Connell, Pres	Muskegon	Holton.
E. M. Ruggles	Whitehall	Whitehall.
Newaygo County:		
Schrier & Klooster	Grant, R. D	Grant.
Oceana County:		
Walkerville Brick & Tile Co., Alton J. Walker, Prop	Walkerville	Walkerville.
Ottawa County:		
Zeeland Brick Co	Zeeland	Zeeland, also in Allegan, Barry, and Kalamazoo Cos.
Saginaw County:		
Parker-Lehmann Brick & Tile Co	Saginaw, W. S., R. D. 10	Paines.
Mrs. Peter Roble	Saginaw, W. S., R. D. 10	Paines.
Sperry Bros, Chas. E. Sperry	Paines, via Saginaw, W.S	Paines.
James Day	Saginaw, R. D. 8	Saginaw.
Thomas Day	Saginaw, R. D. 3	Saginaw.
Saginaw Paving Brick Co., John H. Qualman, Mgr	1850 S. Jefferson St., Saginaw, E. S	Saginaw.
St. Clair County:		
Frederick A. Beard	Atkins, R. D. 2	Ruby.
Belknap & Phillips	Bell River Road, St. Clair	St. Clair.
Sanilac County:		
John Large	Brown City	Brown City.
Croswell Brick Co	Croswell	Croswell.
Minden City Brick & Tile Works, A. H. Jones, Prop	Minden City	Minden City.
Dawson & Bissett	Sandusky	Sandusky.

BRICK AND TILE MANUFACTURERS, 1912.—*Concluded.*

Operators.	Office.	Works
Shiawassee County:		
Detroit Vitrified Brick Co., J. P. Kaiser, Mgr.	Box 289, Corunna	Corunna.
M. L. Parker	822 S. Cedar St., Owosso	Owosso.
Reliance Motor Truck Co	Owosso	Owosso.
Tuscola County:		
Charles Hall	Cass City	Cass City.
John Thompson & Son	Tuscola	Tuscola.
Van Buren County:		
James Stewart	Bangor, R. D. 2	Bangor.
Hartford Drain Tile Co., L. P. Walker, Prop.	Hartford	Hartford.
Wayne County:		
Henry Ford. Lessee of A. Wagner property	1254 Dix Ave., Detroit	Dearborn.
Burke Bros	2296 Michigan Ave., Detroit	Detroit.
Jacob Daniel & Bros., Brick Co	1955 Michigan Ave., Detroit	Detroit.
John S. Haggerty	312 Hammond Bldg., Detroit	Detroit.
John C. McDonald & Son	15 McGraw Bldg., Detroit	Springwells.
Schneider Brick Co	605 Dix Ave, Detroit	Detroit.
Wolf & Dei	40 29th St., Detroit	Detroit.
Bunte Bros	Flat Rock	Flat Rock.
Beardslee Bros	Redford	Redford.
Geo. H. Clippert & Bros. Brick Co	1960 Mich. Ave., Detroit	Springwells.
Wm. Clippert	1950 Mich. Ave., Detroit	Springwells.
Combination Brick Co., Frank A. Rasch, Sec.	1427 Majestic Bldg., Detroit	Springwells.
Detroit Roofing Tile Co, August Hecht, Treas.	304 Bamlet Bldg., Springwells, Detroit	Springwells.
Michael Downey	699 Campbell Ave., Detroit	Springwells.
Lonyo Brick Co	Michigan Ave. & Lonyo Road, Detroit	Springwells.
Lonyo Bros	Michigan Ave., Springwells, Detroit	Springwells.
Porath Bros	301 Penobscot Bldg., Detroit	Springwells.
Sass Bros. & Steue	32 29th St., Detroit	Springwells.
Springwells Brick Co., W. T. Walker, Mgr.	1009 Hammond Bldg., Detroit	Springwells.
Walker & Frank Brick Co., Props		
F. H. Wolf Brick Co	1467 Central Ave., Detroit	Springwells.
John M. Welch	303 Hammond Bldg., Detroit	Ford City.
Wexford County:		
Cadillac Brick Co., Wilcox Bros	Cadillac	Cadillac.
Estate of Robt. Wilson	Cadillac	Harriette.
Vosburg, Stanley & Cornewell	Cadillac	Cadillac.

MICHIGAN COAL

Operator.	Office.	Mine.
Bay County:		
Central Coal Mining Co. (Consol'd Coal Co.)	Saginaw	Central
Handy Bros. Mining Co	Bay City, W. S.	Monitor
Michigan Vitrified Brick Co	Bay City, W. S.	
Republic Coal Co. (Robt. Gage Coal Co.)	Bay City, E. S.	Beaver
Robert Gage Coal Co	Bay City, E. S.	Robt. Gage No. 5
Robert Gage Coal Co	Bay City, E. S.	Robt. Gage No. 6
Robert Gage Coal Co	Bay City, E. S.	Black Diamond or Robt. Gage No. 7
Royal Coal Co	Bay City, W. S.	Royal
United City Coal Co. (Consol'd Coal Co.)	Saginaw	United City
What Cheer Coal Co	Bay City	What Cheer
Wolverine Coal Co., (Consolidated Coal Co.)	Saginaw	Wolverine No. 2
Wolverine Coal Co., (Consolidated Coal Co.)	Saginaw	Wolverine No. 3
Calhoun County:		
*Jackson Coal Co	Albion	
Eaton County:		
H. D. Pickens	Grand Ledge	Pickens
M. D. Sattler	Grand Ledge	Sattler
Eben Wright	Grand Ledge	Wright
Genesee County:		
Genesee Coal Co	Flint	Genesee No. 1
Genesee Coal Co	Flint	Genesee No. 2
What Cheer Coal Co	Bay City	What Cheer No. 2
Ingham County:		
Cedar River Coal Co	Williamston	Cedar River
Saginaw County:		
Banner Coal Co	Swan Creek	Banner
Bliss Coal Co	Swan Creek	Swan Creek
Buena Vista Coal Co	Saginaw	Buena Vista
Caledonia Coal Mining Co	Saginaw	Caledonia No. 2
Caledonia Coal Mining Co	Saginaw	Caledonia No. 3
Carbon Coal Co	Saginaw	Verne or Carbon
‡Consolidated Coal Co	Saginaw	Chappel & Fordney No. 2
‡Consolidated Coal Co	Saginaw	P. Marquette No. 3
Jimtown Coal Co. (Consolidated Coal Co.)	Saginaw	"Jimt'n" or Northern
Riverside Coal Co., (Consolidated Coal Co.)	Saginaw	Riverside No. 1
‡Riverside Coal Co., (Consolidated Coal Co.)	Saginaw	Riverside No. 2
Robt. Gage Coal Co	Bay City	No. 2 (Old)
Robt. Gage Coal Co	Bay City	No. 2 (New)
Robt. Gage Coal Co	Bay City	No. 3
Saginaw Coal Co., (Consolidated Coal Co.)	Saginaw	Saginaw Old Mine
Shiawassee Coal Co. (Consolidated Coal Co.)	Saginaw	Shiawassee
Uncle Henry Coal Co., (Consolidated Coal Co.)	Saginaw	Uncle Henry
Shiawassee County:		
Corunna Union Coal Co	Corunna	Union Mine
Detroit Vitrified Brick Co	Detroit	Peak
Nond-Kean Coal Mining Co		
Tuscola County:		
Handy Bros. Mining Co	Bay City, W. S.	Akron

*Shaft not yet completed.
‡Not yet in operation.

MINES IN 1912.

Location.	General Manager.	Superintendent.	Remarks.
Bay City, W. S	R. M. Randall	Jno. Weaver	Abandoned.
Monitor Twp., S. W. ¼, N. W. ¼, Sec. 22	T. L. Handy	James Love	
Frankenlust Twp., N. E. ¼, Sec. 1	J. Barnett		Drowned by by high w'r.
Frankenlust Twp., N.W. ¼, S. E. ¼, Sec. 2	Chas. Coryell	Wm. Jones.	
Monitor Twp., S. W. ¼, N. E. ¼, Sec. 19	Chas. Coryell	H. Lewis	
Monitor Twp., S. W. ¼, S. E. ¼, Sec. 18	Chas. Coryell	A. Dorran	
Monitor Twp., N. E. ¼, S. E. ¼, Sec. 30	Chas. Coryell	Thos. Thompson.	
Bay City, W. S	Jos. Bierd	J. Calhoun.	
Bay City, W. S	R. M. Randall	Geo. Woodhead	Abandoned.
Merritt Twp., Sec. 30	E. B. Foss	Wm. Thompson.	
Monitor Twp., S. W. ¼, S. E. ¼, Sec. 17	R. M. Randall	A. McElwain.	
Williams Twp., S. E. ¼, N. E. ¼, Sec. 12	R. M. Randall	Wm. Williams.	
Four and half miles E. of Albion	C. W. Selbers	Irving Jenkins.	
Grand Ledge	H. D. Pickens.		
Grand Ledge	M. D. Sattler.		
Grand Ledge	E. Wright.		
Flint	DeVere Hall		Abandoned.
Flint	DeVere Hall		Idle.
Flint	E. B. Foss	A. Jefferies	Shaft not completed.
Williamston	T. M. Jenkins.		
James Twp., N. E. ¼, S. W. ¼, Sec. 12	W. B. Carmichael		Drowned by high water.
James Twp., S. E. ¼, S.W. ¼, Sec. 11	C. E. Linton	Jno. Phillips	Abandoned.
Buena Vista Twp., S. W. ¼, Sec. 31	Arthur Hun	Jno. Harris	Drowned.
Saginaw Twp., N. W. ¼, S. E. ¼, Sec. 22	John Dagan.		
Saginaw Twp., S. E. ¼, Sec. 21	John Dagan.		
	E. Savage.		
Saginaw, E. S	R. M. Randall.		
Saginaw Twp., S. E. ¼, N. E. ¼, Sec. 33	R. M. Randall	Jno. Snowball.	
James Twp., S. W. ¼, N. E. ¼, Sec. 7	R. M. Randall	Tim Hollis.	
James Twp., S. W. ¼, N. E. ¼, Sec 4	R. M. Randall	Geo. Nyehouse.	
Saginaw, W. S., N. E. ¼, N. E. ¼, Sec. 3	R. M. Randall	Geo. Nyehouse.	
St. Charles Twp., N. E. ¼, N. E. ¼, Sec. 17	Chas. Coryell	Richard Jenkins.	
St. Charles Twp., N. E. ¼, S. W. ¼, Sec. 9	Chas. Coryell	Richard Jenkins.	
St. Charles Twp., S. E. ¼, N. W. ¼, Sec. 17	Chas. Coryell	Henry Donse.	
Buena Vista Twp., N. E. ¼, Sec. 31	R. M. Randall	Robt. Johnson.	
James Twp., S. E. ¼, S. W. ¼, Sec. 8	R. M. Randall	Thos. Westwood.	
Blumfield Twp., N. W. ¼, Sec. 18	R. M. Randall	John Snowball.	
Corunna	W. F. Striggon.		
Corunna	F. Schmidt	J. J. Johnson.	
Owosso	J. J. Kean	John Edwards.	
Fairgrove Twp., N. W. ¼, N. W. ¼	T. L. Handy	D. Morris.	

COKE PRODUCERS, 1912.

Operators.	Address.	Location or name of mine.	No. of oven.	County.
Michigan Alkali Co	Wyandotte	Plant No. 2	U. O. 30	Wayne.
Semet-Solvay Co	Syracuse, N. Y	Detroit	S. S. 132	Wayne.

LIMESTONE PRODUCERS, 1912.

Operators.	Office.	Quarry.
Alpena County:		
R. Collins, (also lime)	151 Water St., Alpena	Alpena.
Illinois Steel Co	72 W. Adams St., Chicago, Illinois	Alpena.
Michigan Alkali Co	Wyandotte (or Detroit)	Alpena.
Arenac County:		
M. J. Griffin	169 Stanton Ave., Detroit	Alpena.
Jas. McDonald, (also lime)	Twining	Twining.
Bay County:		
Boutell Bros. & Co., (also lime)	1201 Water St., Bay City	Bay City.
Charlevoix County:		
Elk Cement & Lime Co., E. M. Sly, Sec., (also lime)	Elk Rapids	Bayshore.
Northern Lime Co., (also lime)	Grand Rapids	Bayshore.
Superior Lime Co., (also lime)	2 First Ave., Gd. Rapids.	Bayshore.
Charlevoix Rock Product Co., (also lime)	Charlevoix	Charlevoix.
City of Charlevoix Street Commissioner	Charlevoix	Charlevoix.
Cheboygan County:		
Campbell Stone Co., (also lime)	Afton	Afton.
Chippewa County:		
Drummond Island Stone Co., Ludlow Seaman	Drummond	Drummond.
Delta County:		
Delta Contracting Co	108 N. Charlotte St., Escanaba	Escanaba (Hyde).
Escanaba Stone & Gravel Co	917 Ludington St., Escanaba	Escanaba (Groos.)
A. T. Garland	Escanaba	Escanaba (Hyde.)
John Bichler	Groos	Groos (Escanaba.)
Emmet County:		
Antrim Lime Co	912 Mich. Trust Bldg., Grand Rapids	Petoskey.
Michigan Lime Co., (also lime)	Petoskey	Petoskey.
Petoskey Crushed Stone Co	Petoskey	Petoskey.
The Petoskey Stone and Lime Co., L. G. Grimes, (also lime)	1220 Emmet St., Petoskey	Petoskey.
Huron County:		
Wallace Stone Co	Bayport	Bayport.
Jackson County:		
Jackson Stone Co	Jackson	Jackson.
Mackinac County:		
Ozark Stone Quarry, E. W. Hough, Mgr	Ozark	Ozark, (operated by Ozark Qy. Co. for a time only.)
Union Carbide Co., (also lime)	79 Wall St., New York, N. Y	Rexton.
S. P. Martin Co	Fiborn Quarry	Fiborn Quarry.
Marquette County:		
F. B. Spear & Sons	Marquette	Marquette.

LIMESTONE PRODUCERS, 1912.—*Concluded.*

Operators.	Office.	Works.
Menominee County:		
Menominee Stone Crusher, Robert Rick, Prop	2401 Broadway, Menominee	Menominee.
Monroe County:		
B. E. Bullock	433 Delaware Ave., Toledo, Ohio	Dundee.
Shore Line Stone Co., Thornton Dixon, Pres.	Monroe	Frenchtown.
Chas. Augerer, Jr	R. F., Maybee	Maybee (near Shofield)
John Horing	Monroe	Monroe.
Monroe Stone Co., Fred C Wagner, Sec	12 Washington St	Monroe.
Sam W. Morris	Monroe	Monroe.
Newport Stone Co	12 Woodward Ave, Detroit	Newport.
W. M. Strouse	Ottawa Lake	Ottawa Lake.
R. H. Nogar	Samaria	Samaria.
Morris Cummins	R. F. D. 1, Samaria	Temperance.
Oakland County:		
The Henry Merdian Co., (cobblestones), W. O. Smith, Mgr	616 Moffat Bldg., Detroit	Clarkston.
Presque Isle County:		
Michigan Limestone & Chem. Co	55 Liberty St., New York, N. Y	Calcite.
Onaway Limestone Co	Onaway	Onaway.
Schoolcraft County:		
The White Marble Lime Co	Manistique	Blaney (no lime here.)
The White Marble Lime Co., (also lime)	Manistique	Manistique.
The White Marble Lime Co., (also lime)	Manistique	Marblehead.
Wayne County:		
Gibraltar Quarry Co	80 Griswold St., Detroit	Gibraltar.
Solvay Process Co., (also lime)	Syracuse, N. Y	Trenton and Sibley.
Dunbar Stone Co	Detroit	Quarry (?) mouth of Detroit River (Quarry for Gov. work.) (Stone is dredged.)

LIST OF SAND AND GRAVEL PRODUCERS OF MICHIGAN.

Alcona County:

Curtis Township—
Lilly, Samuel, Glennie P. O., Michigan.
Paul, Allen, Glennie P. O., Michigan.

Gustin Township—
Township Pits.

Harrisville Township—
Barlow, Jno., Harrisville, Michigan.
Campbell, Archie, Harrisville, Michigan.
Elmer, Frank, Harrisville, Michigan.
Holmes, George, Harrisville, Michigan.

Alger County:

Limestone Township—
The C. C. I. & Co., Negaunee, Michigan.
The N. W. C. & L. C., Gladstone, Michigan.

Mathias Township—
North, W., Cooperage Co., Gladstone, Michigan.
Williams, W. V., Winters, Michigan.

Onato Township—
Alanko, Herman (?)
C. C. I. Co., (?)
Hongisto, V. (?)
Peter White Co. (?)
Schaffer, C. H. (?)

Allegan County:

(?) *Township—*
Barrett, Wm., Dunningville, Michigan.
Kouliak, John, Allegan, Michigan.
Peet, A., Allegan, R. F. D. No. 8, Mich.
Stratum, John N., R. F. D., No. 8, Mich.

Casco Township—
Fry, W. G., South Haven, Michigan.
L. L. Otis, Kibbie, Michigan.

Dorr Township—
Troutman, Ray, Moline, Michigan.
Weber, George, Dorr, Michigan.

Fillmore Township—
Kooyker, G. G., Hamilton, R. F. D. No. 2, Mich.
Schoop, Otto G., Holland, R. F. D. No. 7, Michigan.

Ganges Township—
Davis, C. N., Fennville, R. F. D. No. 1, care of E. H. Atwater, Mich.
Spanknebell, (?) Fennville, R. F. D. No. 1, Mich.

Gun Plain Township—
Anson, Floyd, Plainwell, R. F. D., Mich.
Myers Bros., Plainwell, R. F. D., Mich.
Roberts, Frank, Plainwell, R. F. D., Mich.
Sperry, L. D., Doster, R. F. D., Mich.
Stamp, A. J., Plainwell, R. F. D., Mich.
Wilroth, Sarah, Doster, R. F. D., Mich.

Heath Township—
Brower, Ed., Dunningville, Mich.
Alderink, Joe, Hamilton, Mich.
TeraVest, John, Hamilton, Mich.
Terpstra, Geo., Dunningville, Mich.

Laketown Township—
Knoll, John, Holland, R. F. D. No. 1, Mich.

Manlius Township—
Kool, Henry, New Richmond, Mich.

Martin Township—
Anderson Est., Arthur, Martin, Mich.
Anderson, Fannie, Martin, Mich.
Carpenter, A. B., Martin, Mich.
Larraway, D. F., Martin, Mich.
McLoud, G., Martin, Mich.
McVean, Millard, Martin, Mich.
Wheeler, Mrs. J. C., Martin, Mich.

Salem Township—
Buege, Norm, Dorr Center, R. F. D. No. 2, Mich.
Sutter, Fred Wm., Byron Center, R. F. D. No. 62, Mich.
Wiest, Peter, Dorr Center, R. F. D. No. 2, Mich.

Wayland Township—
Dean, Mrs. John, Shelbyville, Mich.
Swartz, John Bradley, Mich.

Alpena County:

Alpena Township—
Riley & Monkman, 501 State St., Alpena, Michigan.

Antrim County:
Banks Township—
Elzinga, Martin, Central Lake, Mich.
Wilson, Emanuel, Ellsworth, Mich.

Central Lake Township—
Sand, F. E., Sirron, Central Lake, Mich.
Smith, John C., Central Lake, Mich.

Custer Township—
Township Pits.

Elk Rapids Township—
Township Pits.

Forest Home Township—
Candall, F. S., Bellaire, R. F. D. No. 1, Mich.
May, Wm., Bellaire, R. F. D. No. 2, Mich.
New, C. O., Bellaire, R. F. D. No. 1, Mich.
Powell, B. J., Bellaire, R. F. D. No. 2, Mich.
Stiner, Jake, Bellaire, R. F. D. No. 1, Mich.

Kearney Township—
Hilton, Robert, Bellaire, Mich.
Waurpel, A., Bellaire, Mich.

Mancelona Township—
Antrim Iron Co., Mancelona, Mich.
Austin, S., Mancelona, Mich.
Campbell, W., Mancelona, Mich.
Foot, D. A., Mancelona, Mich.
Grody, E., Mancelona, Mich.
Hardesty, S., Mancelona, Mich.
Swan, Guy, Mancelona, Mich.

Torch Lake Township—
Glazier, Geo., Central Lake, R. F. D. No. 1, Mich.
Guth, F. W., East Port, Mich.
Clark, Hiram, Central Lake, R. F. D. No. 1, Mich.
Harvey, M. L., East Port, Mich.
McPherson, Guy, East Port, Mich.
Page, H. R., Jaxon, Mich.
Russell, John, East Port, Mich.

Arenac County:
Adams Township—
Nixner, Carl, Standish, R. F. D. No. 2, Mich.
Wells, H., Standish, R. F. D. No. 2, Mich.

Au Gres Township—
No gravel in township.

Clayton Township—
Daniels, Wm., Sterling, R. F. D. No. 1, Mich.
Lasure, Frank, Sterling, R. F. D. No. 1, Mich.

Mason Township—
Deitzel, Henry, Twining, R. F. D. No. 2, Mich.
Lagman, (?), Twining, R. F. D. No. 2, Mich.
Pettit, Frank, Twining, R. F. D. No. 1, Mich.
Squires, Joe, Turner, Mich.

Moffatt Township—
Merrick, Mrs. Jannie, Alger, Mich.

Turner Township—
Rodgers, Sidney, Twining, Mich.

Baraga County:
Marshall Butters Lumber Co., L'Anse, Mich. (Arvon T.)
Loosemore, George, Skanee, Mich.

Baraga Township—
Wolmer, Charles, Baraga, Mich.

Covington Township—
Township Pits.
Keskinen, John, Covington, Mich.

Spurr Township—
Michigan Land & Iron Co., Marquette, Mich.
Sheldon & Duglass, Houghton, Mich.

Barry County:
Assyria Township—
Miller, Arthur J., Nashville, R. F. D. No. 4, Mich.
Palmiter, S. J., Bellevue, R. F. D. No. 4, Mich.
Tuckerman, Charlie, Bellevue, R. F. D. No. 3, Mich.
Vonnocken, E., Bellevue, R. F. D. No. 6, Mich.

Baltimore Township—
Aultman, Otis, Hastings, R. F. D. No. 4, Mich.
Hokomb, Mrs. Adelia, Hastings, R. F. D. No. 6, Mich.

Barry Township—
Letts, W., Delton, Mich.
Lichtnitener, Charlie, Delton, Mich.

Carlton Township—
Lancaster, J., Hastings, Mich.
Woolston, Mr., Hastings, Mich.

Hastings Township—
Andrews, Wm., Hastings, Mich.
McIntosh, Scot, Quinby, Mich.
Schanty, Wm., Hastings, Mich.

Hope Township—
Osgood, Mr. Ira, Cloverdale, R. F. D., Mich.
Owens, Mr. Art, Delton, R. F. D. No. 3, Mich.

Thornapple Township—
Campbell, Scott, Middleville, Mich.
Cleuer, Lloyd, Middleville, Mich.
Davis, George (Sr.), Middleville, Mich.
Finkbeiner, Geo., Middleville, Mich.
Hoyt, Mrs. M. A., Middleville, Mich.
Harpter, Wm., Middleville, Mich.
Stokoe, Fred, Middleville, Mich.

Woodland Township—
Jordon, Dayton, Woodland, Mich.
Jordon, Bernie, Woodland, Mich.
Hitt, Geo., Woodland, Mich.
King, Allen, Woodland, Mich.
Smith, J. H. M., Woodland, Mich.
Welch, Edd., Woodland, Mich.

Yankee Springs Township—
Headley, A., Mayland, R. F. D., No. 2, Mich.
Park, Bennie, Middleville, R. F. D. No. 4, Mich.

Bay County:
Bangor Township—
Hayward, R., R. F. D. No. 3, Bay City, Michigan.

Frankenlust Township—
No sand or gravel in township.

Monitor Township—
Gillman, A. (?)
Beard, W. (?)
Lemkey, H. (?)

Mt. Forest Township—
No sand or gravel in township.

Pinconning Township—
No sand or gravel in township.

Benzie County:
Almira Township—
Schneider, Adam, Lake Ann, Mich.
Wilson, Fred, Lake Ann, Mich.

Colfax Township—
Dwyer, Sarrah, Nesen City, Mich.
Sebens, H. B., Nesen City, Mich.

Hammer, Herb, Thompsonville, Mich.
Hively, Chas., Thompsonville, Mich.
Hyde, Partley, Nesen City, Mich.
Kochendefer, Wm., Thompsonville, Mich.

Gilmore Township—
No sand or gravel in township.

Inland Township—
Huddleston, Wm., Bendon, R. F. D. No. 2, Mich.
McCwaig, F. D., Bendon, R. F. D. No. 2, Mich.

Joyfield Township—
Davis, W. O., Benzonia, R. F. D. No. 1, Mich.
Rice, J. R., Benzonia, R. F. D. No. 1, Mich.

Platte Township—
Baxter, J. P., Manistee, Mich.
Davey, Fred, Manistee, Mich.
Oleary, Wm., Honor, R. F. D. No. 1, Mich.
Wilce Co., T., Empire, Mich.

Weldon Township—
Ben Newhall & Company, Thompsonville, Mich.

Berrien County:
Bainbridge Township—
Farington, Mrs. George, Watervliet, R. F. D. No. 3, Mich.
Petters, Henry, Watervliet, R. F. D. No. 3, Mich.

Benton Township
Lull, H., Benton Harbor, R. F. D. No. 2, Mich.

Benton and St. Joseph Township—
Benton Harbor Sand Co., Benton Harbor, Mich.
Squire Co., Ed. E., 1520 Bank of Com. Bldg., St. Louis, Mo.

Berrien Township—
Bedford, J. W. (?)
Hocthbergen, L. (?)
Irland, Frank (?)
Whittman, (?) (?)

Bertrand Township—
Leiter, Elmer, Buchanan, Mich.
Womer, W. A., Niles, Mich.

Buchanan Township—
Bishop, Chas., Buchanan, Mich.
Hess, Geo., Buchanan, Mich.
Spaulding, Clarence, Buchanan, Mich.

Chickaming Township—
Chickaming Township Pits, Sawyer, Mich.
Wire, R. L., Lake Side, Michigan.

Lincoln Township—
No sand and gravel pits in township.

Niles Township—
Young Brothers, Niles, Michigan.
Decher, H. P., Niles, Michigan.
Franz, Fred, Niles, Mich.
Roth, John R., Niles, Michigan.
Winn, George, Niles, Mich.

Pipestone Township—
Gilbert, Will, Dowagiac, Mich.
Olney, Ed., Eau Claire, Mich.

St. Joseph Township—
Kerlikowske Bros., St. Joseph, Michigan.

Three Oaks Township—
Sawin, Benj., Three Oaks, Mich.
Warren, C. K., Three Oaks, Mich.

Branch County:
Bethel Township—
Bates, Bert G., Coldwater, Michigan.
Hoyt, Moses, Coldwater, Michigan.

California Township—
Bates, Edwin, Ray, Ind.
Broughton, Lester, Montgomery, Mich.
Ford, Earl, Ray, Ind.
Speer, David, Ray, Ind.

Coldwater Township—
Fredericks, W. H. (?)
Gifford, Earl (?)
Haynes, Levi (?)
Kyte, Oscar (?)
Sherman, Filbert (?)

Girard Township—
Kingston, Lyman, Union City, R. F. D. No. 5, Mich.
Girard Twp. Pits, Coldwater, Mich.
Reed, Chas., Coldwater, R. F. D. No. 9, Mich.
Wye, I. L., Coldwater, R. F. D. No. 7, Mich.

Matteron Township—
Birch, Wm., Union City, Mich.
Werner, Jake, Bronson, Michigan.

Ovid Township—
Davis, Ed., Coldwater, Mich.
Quinby, G. F., Coldwater, Mich.

Branch County:
Sherwood Township—
Sargent, E. L., Sherwood, Mich.
Spencer, G. M., Sherwood, Mich.

Union Township—
Brown, Vern, Union City, Mich.
Strong, Geo., Union City, Mich.
Thatcher, Mrs. C. M., Union City, Mich.
Whitcomb, L. S., Union City, Mich.

Calhoun County:
Athens Township—
Blowers, N. A., Athens, Mich.
Marrow, O. G., Athens, Mich.

Battle Creek Township—
Adams, Jasper Battle Creek, Mich.
Adrian, John, 323 Hamblin Ave., Battle Creek, Mich.
Baltz, Geo. D., 209 Kendall St., Battle Creek, Mich.
Cowles, R. B., Battle Creek, Mich.
Crystal Sand & Gravel Co., Battle Creek, Mich.
Fish, E. I., 15 Grove St., Battle Creek, Mich.
Hiscock, Seth, Battle Creek, R. D. No. 8, Mich.
Home & Fireside Co., Battle Creek, Mich.
Mills, Mrs. W., Battle Creek, R. D. No. 8, Mich.
Porter, G. W., Battle Creek, R. F. D. No. 6, Mich.
Post Land Co., Battle Creek, Mich.
Walter, Willard, Sturgis, Mich.

Bedford Township—
Bedford Township Pits, Battle Creek, Mich.
Miller, (?), Battle Creek, Mich.
Sperry & Son, Battle Creek, Mich.
Topy, Ben, Battle Creek, Mich.

Burlington Township—
Larnard, Charles, Union City, Mich.
Grosbeek, Fred, Burlington, Mich.
March, Andrew, Union City, Mich.
Washbern, Frank, Burlington, Mich.

Clarence Township—
Hardt, F. A., Springport, Mich.
Ringler, A., Albion, Mich.

Emmett Township—
Brown, Geo., Battle Creek, Michigan.
Morgan, B. F., Battle Creek, R. F. D. No. 1, Mich.
Cronkhite, J. F., Battle Creek, R. F. D. No. 1, Mich.
Fanning, R. W., Battle Creek, R. F. D. No. 1, Mich.

Homer Township—
Mount, F., Homer, Mich.
Watts, James, Homer, Mich.

Leroy Township—
Hall, Homer, Battle Creek, R. F. D., Mich.
Lyod, John, Battle Creek, Mich.

Newton Township—
Funk, F. J., Battle Creek, R. F. D. No. 2, Mich.
Hagelshaw, Albert, Union City, R. F. D. No. 2, Mich.
Schultz, Leo, Ceresco, R. F. D. No. 2, Mich.

Pennfield Township—
Ellis, Bert, Battle Creek, R. F. D. No. 5, Mich.
McKenzie, Geo., Battle Creek, R. F. D. No. 11, Mich.
Potter, A. J., Battle Creek, R. F. D. No. 11, Mich.
Webb, Mrs. M. E., Battle Creek, R. F. D. No. 11, Mich.
Wilbur, Richard, Battle Creek, R. D. No. 11, Mich.

Sheridan Township—
Andrews, Floyd A. Albion, R. F. D. No. 2, Mich.
Johnson, George, Albion, R. F. D. No. 2, Mich.
Krenerick, Charles, Albion, R. F. D. No. 2, Mich.
Roggonbuk, Ernest, Albion, R. F. D., No. 6 Mich.
Young, Willard, Albion, R. F. D. No. 6, Mich.
Quehlkie, William, Albion, R. F. D. No. 7, Mich.

Tekonsha Township—
Hollenbeck, Chas. (?)

Cass County:
La Grange Township—
Fletcher, Clare, Cassopolis, Mich.
Gould, Lowell, Cassopolis, Mich.
Kelsey, Jas. H., Cassopolis, Mich.
McNab, M., Cassopolis, Mich.
Tharp, Mrs. L. S., Niles, Mich.
Tarboss, Squire, Cassopolis, Michigan.
Van Riper, John, Cassopolis, Mich.

Ontwa Township—
Bucklin, H. E., Chicago, Ill.
Hicks, O. V., Edwardsburg, Mich.

Porter Township—
Benson, Joseph, White Pigeon, Mich.
Lintz, Chas., Jones, Michigan.

Silvercreek Township—
Bakeman, H., Dowagiac, Mich.
Curran, P. T., Dowagiac, Mich.
Fricke, W., Dowagiac, Mich.
Ryther, C., Dowagiac, Mich.
Trobridge, Mrs. Wm., Dowagiac, Mich.
Wolf, F., Dowagiac, Mich.

Volinia Township—
Brown, Wilber, Marcellus, R. F. D. No. 6, Mich.
Vancuren, Burl, Decatur, Mich.

Charlevoix County:
Boyne Valley Township.
Carson, W. J., Boyne Falls, Mich.
Pearson, W. J., Boyne Falls, Mich.
Stewart, Frank L., Boyne Falls, Mich.

Evangeline Township—
Gardener, Ben., Boyne City, R. F. D. No. 3, Mich.
Harris, Pat, Boyne City, R. F. D. No. 2, Mich.
Millspaugh, H. E., Boyne City, Mich.
Rounds, Chas., Boyne City, R. F. D. No. 3, Mich.

Eveline Township—
Healey, Chas., East Jordan, R. F. D. No. 2, Mich.
King, Hugh, East Jordan, R. F. D. No. 1, Mich.
Jarman, Geo., East Jordan, R. F. D. No. 2, Mich.
White, Fred, Charlevoix, Mich.

Hudson Township—
Clasbell, Rollo, Vanderbilt, R. F. D. No. 1, Mich.
Davis, Amasa, Boyne Falls, R. F. D. No. 1, Mich.
Llazier, Wm., Boyne Falls, R. F. D. No. 1, Mich.
Webster, H. A., Elmira, Mich.

Marion Township—
Neil, Mrs. Robert O., Charlevoix, R. F. D. No. 2, Mich.
Thices, Mrs. F., Charlevoix, R. F. D. No. 4, Mich.

Melrose Township—
Hass, A. E., Walloon Lake, Mich.

St. James Township—
Beaver Island Lumber Co., St. James, Mich.
Gallaghan, W. J., St. James, Mich.

Cheboygan County:

Benton Township—
Charpointer, Joseph, Cheboygan, R. F. D. No. 2, Mich.
Graves, Adolf, Cheboygan, Mich.
Eno, Adlore, Cheboygan, R. F. D. No. 2, Mich.
Mason, John, Cheboygan, R. F. D. No. 2, Mich.
Wixon, Henry, Cheboygan, R. F. D. No. 2, Mich.

Burt Township—
Township Pits, Topinabee, Mich.

Ellis Township—
Ford, Frank, Wolverine, Michigan.
Roamy, M. E., Wolverine, Michigan.

Munro Township—
Armantrout, Mr., Levering, R. F. D. No. 2, Michigan.

Tuscarora Township—
Hudson, Warren, Indian River, Michigan.
Sabin, Mary, Alanson, Mich.
Steward, A. H., Alanson, Michigan.
Wilver, E. O., Alanson, Mich.

Chippewa County:

Bruce Township—
Beamish, John, Donaldson, Mich.
Buck, James, Rosedale, Mich.
Butler, John, McCarron, Mich.
Crawford, Wm., Donaldson, Mich.
Kirkpatrick, Robert, McCarron, Mich.
Holter, Nat, McCarron, Mich.
Morrow, David, Donaldson, Mich.
Smith, John, Rosedale, Mich.

Drummond Township—
Fairchild, A., Drummond, Mich.
Seaman, Ludlow, Drummond, Mich.

Kinross Township—
No sand and gravel in township.

Pickford Township—
Eveleigh, Mrs. Jos., Stirlingville, Mich.
Hudson, Mrs. T., Rockview, Mich.
Kennedy, Alex., Pickford, Mich.
Michigan Land Co., Sault Ste. Marie, Mich.
Roe, Robert, Pickford, Mich.
Stevenson, Wm., Pickford, Michigan.
Stevenson, Jas., Pickford, Mich.
Taylor, F. H., Pickford, Mich.
Thompson, Mrs. A. C., Pickford, Mich.

Raber Township—

Aullon, Nal., Raber P. O., Mich.
Forgrave, James, Stalwart, P. O. Mich.
Founten, Andred, Gatesville, P. O., Mich.
Stevenson, John, Raber, P. O., Mich.

Sault Ste. Marie Township—
Hatton Bros., Sault Ste. Marie, Mich.
Rye, Jas., 409 Maple St., Sault Ste. Marie, Mich.

Sugar Island Township—
Belanger, Louis, Sault Ste. Marie, Mich.
Chippewa County Pits.
McMullen, John, Hand Station, Mich.
Moore, J. T., Sault Ste. Marie, Mich.

Clare County—

Franklin Township—
Ladd, J. E., Harrison, Mich.
Wallace, Everett L., Gladwin, Mich.

Frost Township—
Onsted, (?), Harrison, Mich.
Page, Wallace, Adrian, Mich

Garfield Township—
Township Pits.

Greenwood Township—
Township Pits.

Hamilton Township—
Mathues, (?), Gladwin, R. F. D. No. 4, Gladwin, Mich.
McCracken, (?), Gladwin, R. F. D. No. 4, Gladwin, Mich.

Hatton Township—
Herman, Henry, Clare, R. F. D. No. 5, Mich.
Magnus, Wm., Clare, R. F. D. No. 5, Mich.

Sheridan Township—
Kliner, H., Clare, R. F. D., No. 6, Mich.
Strouse, W., Clare, R. F. D., No. 2, Mich.

Summerfield Township—
Briggs, John, Leota, Mich.
Burgey, H., Leota, Mich.

Surry Township—
Littlefield, J. L., Farwell, Michigan.
McGoogan, Sam, Farwell, Mich.

Winterfield Township—
Davis, Neal, Marion, R. F. D. No. 2, Mich.
Township Pitts, Marion, R. F. D. No. 2, Mich.

Clinton County:
Bath Township—
Sargent, Collins M., Bath, R. F. D., No. 24, Mich.
Sleight, J. Bath, Michigan.
Wilhelm, Noah, R. F. D., Bath, Mich.

Bengal Township—
Light, Mary, St. Johns, R. F. D. No. 1, Mich.
Pung, Edward, St. Johns, R. F. D. No. 2, Mich.
Schomisch, John, St. Johns, R. F. D No. 3, Mich.

Bingham Township—
Keys, Hiram, St. Johns, Mich.
Sage, Albert, St. Johns, Mich.

Dewitt Township—
Angell, O. G., Lansing, Michigan.
Lerg, C. P., Dewitt, Mich.
Schoewe, Theo., Dewitt, Mich.

Eagle Township—
Babbitt, B. F., Eagle Mich.
Byam, F. S., Eagle Mich.
Doty, H. P., Eagle Mich.
Eddy, O. L., Eagle Mich.
Havens, R., Eagle, Mich.
Hemisucy, Geo., Eagle, Mich.
How, F. T., Eagle, Mich.
Kleopher, Fred, Dewitt, Mich.
Jones, H. F., Grand Ledge, Mich.
McCrumb, Geo., Eagle, Mich.
Tallman, W. L., Eagle, Mich.
Whittier, N. V., Portland, Mich.

Greenbush Township—
Bond, S., St. Johns, R. F. D., Mich.
Burgess, Wm., St. Johns, R. F. D., Mich.
Case, Henry, St. Johns, R. F. D., Mich.
Doty, Frank, St. Johns, R. F. D., Mich.
Martin, August, St. Johns, R. F. D., Mich.
Mootz, Tony, St. Johns, R. F. D., Mich.
Pratt, Loam, St. Johns, R. F. D., Mich.
Greenwood, Chas., St. Johns, R. F. D., Mich.
Taber, Mrs. L., St. Johns, R. F. D., Mich.
Tinklepough, L., St. Johns, R. F. D., Mich.

Lebanon Township—
Goolthrite, Myron, Hubbardston, Mich.
Hennely, Mrs. James, Maple Rapids, Mich.
Piggott, F. M., Fowler, Mich.
Pinkney, Wm., Maple Rapids, Mich.
Timlin, Mrs. R., Hubbardston, Mich.

Olive Township—
Merrihew, Verne, St. Johns, R. F. D No. 4, Mich.
Protts, George, St. Johns, R. F. D. No. 4, Mich.

Victor Township—
Beckwith, Lyod, Ovid, R. F. D. No. 17, Mich.
Tronchal, Geo., Ovid, R. F. D. No. 17, Mich.

Watertown Township—
Conrad, K. H., Lansing, R. F. D. No. 4, Mich.
Cushmaul, Gottleib, Dewitt, R. F. D. No. 8, Mich.

Crawford County:
Frederic Township—
Township Pits.

Lovell Township—
Ward, G. W., Avery Island, La.

South Branch Township—
Barns, Orland F., Lansing, Mich.
Blanchard Campbell & DeWale, Roscommon, Mich.
Floeter, P. C., Bay City, Mich.
Latham, Nathan J., Grayling, Mich.
Thoman, Frederick, Lansing, Mich.

Delta County:
Baldwin Township—
No sand or gravel in township.

Bay De Noc Township—
Chicago & N. W. R. R. Co., Chicago, Ill.
Cook, N., Stonington, Mich.
Escanaba Stone & Gravel Co., Escanaba, Mich.
Fitzpatrick, George, Escanaba, Mich.
Jacobsen, M., Stonington, Mich.
Peterson, George, Stonington, Mich.
Ross, Wm. Ogonz, Mich.
Van Cleve, F. H., Escanaba, Mich.

Garden Township—
Lyon, Mrs. J., Garden, Mich.
Bamfass, Garden, Mich.
Kellan, Geo., Garden, Mich.
Putvin, Louis, Garden, Mich.

Masonville Township—
Proehl, Hermann, Rapid River, Mich.
Vietzke, Carl, Rapid River, Mich.

Dickinson County:
Breitung Township—
Chicago & N. W. R. R. Co., Chicago, Ill.
McKenna Est., Mary, Quinnesec, Mich.

Norway Township—
Keweenaw Asso., Marquette, Mich.
Vulcan Brick Works, Vulcan, Mich.

West Branch Township—
No sand or gravel in township.

Eaton County:
Benton Township—
Churchill, S. C., Potterville, R. F. D. No. 1, Mich.
French, Est., E., Potterville, R. F. D. No. 1, Mich.
Kinnie, J. L., Charlotte, Mich.
Pinch, Ray, Potterville, Mich.
Township Pits.

Carmel Township—
Beach Mfg. Co., Charlotte, Mich.
Myers, Mr., Charlotte, R. F. D. No. 10, Mich.
Phillips, Mrs., Charlotte, R. F. D. No. 10, Mich.

Delta Township—
Abfalter, Adam, Lansing, R. F. D. No. 6, Mich.
Saier, Harry, Lansing, R. F. D. No. 6, Mich.
Sawyer, J. J., Lansing, R. F. D. No. 2, Mich.

Eaton Township—
Dacons, Mrs. J. H., Charlotte, Mich.
Lamont, H. A., Charlotte, Mich.
Shepherd, L. H., Charlotte, Mich.
Van Dusen, Est., Mary, Eaton Rapids, Mich.

Eaton Rapids Township—
Hilliard, Will, Eaton Rapids, Mich.
Johnson, C., Eaton Rapids, Mich.
Keeney, W. T., Eaton Rapids, Mich.
Meacham, J., Eaton Rapids, Mich.
Parker, Guy, Eaton Rapids, Mich.
Wood, M., Eaton Rapids, Mich.

Hamlin Township—
Holmes, A., Eaton Rapids, Mich.
Hovey, Mrs., Eaton Rapids, Mich.

Kalamo Township—
Mead, Ira, Charlotte, R. F D. No. 2, Mich.
Tompson, Frank, Vermontville, R. F. D. No. 4, Mich.

Oneida Township—
Divine Bros., Grand Ledge, Mich.
Frost, C. A., Grand Ledge, Mich.
Gibbs, Mrs. Hattie L., Grand Ledge, Mich.
Kent, V. M., Grand Ledge, Mich.

Rozana Township—
Anderson, A., Charlotte, R. F. D., Mich.
Fultz, Washington, Grand Ledge, Mich.
Rimmel, Geo., Mulliken, R. F. D. No. 2, Mich.

Sunfield Township—
Cheal, J. E., Sunfield, Mich.
Roberts, A., Sunfield, Mich.

Vermontville Township—
Church, H. H., Vermontville, Mich.
Wells, C. E., Vermontville, Mich.

Windsor Township—
Hull, John, Dimondale, Mich.
Mercer, Rufus, Dimondale, Mich.
Ripley, Benj., Dimondale, Mich.
Weldon, Mrs. E., Dimondale, Mich.

Emmet County:
Bear Creek Township—
Cable, Leu, Petoskey, Mich.
Hasting, Dave, Conling, Mich.
Kruzel, Peter, Petoskey, Mich.

Bliss Township—
Errickson, J., Bliss, Mich.
Johnson, James, Bliss, Mich.
Keisen, James, Levering, Mich.

Cap Lake Township—
Carlton, Geo., Levering, Mich.
Hoog, A., Mount Pleasant, Mich.

Center Township—
Sand and gravel but owner unknown.

Cross Village Township—
Kruskie, James, Cross Village, Mich.

McKinley Township—
Sand and gravel but owner unknown.

Springvale Township—
Fike, Henry, Wildwood, Mich.
Lambert, J. H., Petoskey, Mich.

Genesee County:
Atlas Township—
Borton, H. W., Goodrich, R. F. D. No. 1, Mich.
Stine, Martin, Goodrich, Mich.

Burton Township—
Root, Charlie, Flint, R. F. D. No. 6, Mich.
Wolcott, L., Flint, R. F. D. No. 6, Mich.

Davison Township—
Bird, Joseph, Davison, Mich.
Daly, T., Davison, Mich.
Kitchen, W. S., Davison, Mich.
Taumble, A. M., Davison, Mich.

Fenton Township—
Bowles, E., Linden, Mich.
City of Linden, Linden, Mich.
Hogan, Daniel, Linden, Mich.
Fletcher, Seward, Linden, Mich.
Sansan, Geo., Linden, Mich.
Orr, Robert, Linden, Mich.

Flint Township—
Flint Sandstone Brick Co., Flint, Mich.

Flushing Township—
Buell, Jake, Flushing, Mich.
Deland, Albert, Flushing, Mich.
Formen, O. G., Flushing, Mich.
Jorden, E., Brent Station, Mich.
Turner, John Flushing, Mich.
Miller, Wm., Flushing, Mich.

Gaines Township—
Allen, John, Gaines, Mich.
Brown, D., Swartz Creek, Mich.
Burnt, Ed., Duffield, Mich.
Crapo Farm, Swartz Creek, Mich.

Genesee Township—
Merrick, S., Flint, R. F. D., Mich.
Scott, F. D., Genesee, Mich.

Mundy Township—
Johnson, Ernie, Swartz Creek, Mich.
Reid, Alfred, Flint, Mich.

Richfield Township—
Clemons, A., Davison, Mich.
Mathews, A., Rogersville, Mich.

Vienna Township—
Andrews, Chas., Clio, Mich.
Jones, Fred, Clio, Mich.
Montague, Ed., Clio, Mich.

Gladwin County:
Bentley Township—
Wilkinson, Frank, Estey, Mich.

Billings Township—
Rose, John, Billings, Mich.

Buckeye Township—
Sand and gravel in township but unable to make out the owners of the pits.

Butman Township—
Hagger, Arthur, Gladwin, Star Route, Mich.
Soldan, L. V., Butman, Mich.

Clement Township—
Challin, Henry, Alger, R. F. D. No. 1, Mich.
Cummings, J., Alger, R. F. D. No. 1, Mich.
Grover, J. H., Alger, R. F. D. No. 1, Mich.
Loop, John, Alger, R. F. D. No. 1, Mich.
Stevens, H., Alger, R. F. D., No. 1 Mich.

Sherman Township—
Cassiday, Thomas, Gladwin, R. F. D. No. 4, Mich.
Fisher, Chas., Oberlin, P. O., Mich.

Tobacco Township—
McKibbin, Roy, Beaverton, Mich.
Wenzel, John, Beaverton, R. F. D. No. 1, Mich.

Gogebic County:
Bessemer Township—
Castile Mining Co., Ramsay, Mich.
Erickson, Herman, Bessemer, Mich.
Bolson, Otto, Bessemer, Mich.
Santijohn, J., Bessemer, Mich.

Watersmeet Township—
Chicago & N. W. R. R. Co., Chicago, Illinois.

Grand Traverse County:
Grant Township—
Brigham, F. A., Buckley, Mich.
B. & D. Lumber Co., Manistee, Mich.

Green Lake Township—
Adamec, Joe, Bendon, R. F. D. No. 1, Mich.
Saxton, W. J., Interlochen, Mich.

Long Lake Township—
Kindgon, Henry, Traverse City, R. F. D. No. 2, Michigan.
Thomas, J., Traverse City, Mich.

Paradise Township—
Koch, John, Mayfield, Mich.
Schuster, Jos., Summit City, Mich.

Union Township—
Hager, Mark, Fife Lake, Mich.

Whitewater Township—
Gay, Wm., Elk Rapids, Mich.
Watson, Walter, Rapid City, Mich.
Township Pits.

Gratiot County:

Arcada Township—
Cline, B. F., Alma, Mich.
Curtis, C., Ithaca, R. F. D No. 9, Mich.
Ydell, A., St. Louis, R. F. D. No. 6, Mich.

Bethany Township—
Burlingame, John, Breckenridge, Mich.
Sawvel, Robert, Breckenridge, Mich.

Ithaca Township—
Drayer, Ed., Ithaca, Mich.

Lafayette Township—
Cob, Wm., Breckenridge, Mich.
Smith, H., Breckenridge, Mich.

New Haven Township—
Davis, Chas., Sumner, R. F. D., No. 2, Mich.
Wiles, Wm., Sumner, R. F. D. No. 1, Mich.

North Shade Township—
Connell, Thomas O., Carson City, Mich.
Rosecrance, Jay, Carson City, Mich.

North Star Township—
Dibble, A. T., Ithaca, R. F. D. No. 6, Mich.
Greenby, I. North Star, R. F. D. No. 1, Mich.
Hass Bros., North Star, R. F. D. No. 3, Mich.
Pittman, Charles, North Star, R. F. D. No. 3, Mich.

Pine River Township—
Church, I. H., Alma, Mich.
Whitecraft, Frank, Alma, Mich.

Seville Township—
Bradley, C. Riverdale, Mich.
Brazee, Chas., Riverdale, Mich.
Crum, Wm. C., Elwell, Mich.
Dexter, James, Shepherd, Mich.
Humphrey, R., Elwell, Mich.
Lippert, Jacob, Elwell, Mich.
Miller, H. M., Elwell, Mich.
Gould, Wm., Riverdale, Mich.
Moffett, John, Elwell, Mich.
Taylor, J. P., Elwell, Mich.

Sumner Township—
Andrews, Geo., Elm Hall, Mich.
Gee, B. J., Alma, Mich.
Hale, D., Sumner, Mich.
Long, Wm. R., Elm Hall, Michigan.
Newsbomb, (?) Sumner, Mich.
Tomlin, A., Sumner, Mich.

Hillsdale County:

Amboy Township—
Howald, George, Camden, R. F. D. No. 37, Mich.
Morgan, H. C., Camden, R. F. D. No. 37, Mich.

Camden Township—
Brown, L. A., Camden, Mich.
Fowler, H. M., Camden, Mich.

Fayette Township—
Gilnur, Ed., Jonesville, Mich.
Howard, E. F., Jonesville, Mich.
Lake Shore & Mich. So. R. R. Co., Chicago, Ill.

Hillsdale Township—
Nelson E. Wolcott, Hillsdale, Mich.
Stevens, C. J., Hillsdale, Mich.

Jefferson Township—
Oldenwilder, J., Pittsford, R. F. D. No. 29, Mich.
Putt, George, Osseo, Michigan.

Ransom Township—
Brown, Chas., Osseo, Mich.
Benson, Est., Pittsford, Mich.
Curth, Frank, Osseo, Mich.
Hoover, A. F., Waldron, Mich.
Mills, Chas., Ransom, Mich.
Schofield, H. C., Pittsford, Mich.
Smith, Leroy, Frontier, Mich.
Thompson, L. W., Waldron, Mich.
Vernier, E., Pittsford, Mich.

Reading Township—
Harper, A. J., Reading, Mich.
Mallery, S. S., Reading, Mich.

Somerset Township—
Baker, Geo., Somerset Center, Mich.
Chandler, Jay, Jerome, Mich.

Wheatland Township—
Fuller, Charlie, Hudson, Michigan.
Pease, A. A., North Adams, Mich.

Woodbridge Township—
Crowl, A., Camden, R. F. D., Mich.
Rubel, Chas., Hillsdale, R. F. D., Mich.
Weaver, George, Hillsdale, R. F. D., Mich

Wright Township—
Cramer, George, Prattville, Mich.
Lickley, Henry, Prattville, Mich.

Houghton County:

Calumet Township—
Centennial Mining Co., Calumet, Mich.
Kearsarge Mining Co., Calumet, Mich.

Chassell Township—
Miron, Eugene, Chassell, Mich.

Elm River Township—
Elm River Copper Co., Elm River, Mich.
Elm River township pits.
Wyandotte Copper Co., Wyandotte, Michigan.

Hancock Township—
Kivari, M., Hancock, Mich.
Kuotsala, H., Hancock, Mich.

Portage Township—
Isle Royale Mng. Co., Houghton, Mich.

Quincy Township—
Hancock Mining Co., Hancock, Mich.

Schoolcraft Township—
No sand or gravel pits in the township.

Stanton Township—
Johnson Est., Andrea, Hancock, Mich.
Kurn, Thomas, Oskar, Michigan.

Huron County:

Bingham Township—
Hurford, George, Ubly, Mich.
Kapler, Philip, Ubly, Mich.
Mills, George, Bad Axe, Mich.
Shaw, Richard, Ubly, Mich.

Bloomfield Township—
Green, W. H., Port Hope, R. F. D. No. 3, Mich.
Perce, Adolph, Fillion, R. F. D. No. 3, Mich.

Caseville Township—
(?)

Colfax Township—
Bordner, John, Bad Axe, Mich.
Hayes, James, Bad Axe, Mich.

Fair Haven Township—
Deming, Herbert, Bay Port, R. F. D. No. 2, Mich.
Sylvanus, M., Sebewaing, Mich.

Lake Township—
Conkey, Sam, Caseville, R. F. D. No. 1, Michigan.

Oliver Township—
No sand or gravel in township.

Port Austin Township—
Haskell, Miss Elizabeth A., Port Austin, Mich.
Henitski, Andrew, Port Austin, Mich.
O'Brien, Michael, Port Austin, Mich.
Wallace Co., The, Port Austin, Mich.

Sand Beach Township—
Highdales, Peter, Harbor Beach, Mich.
McIntosh, John, Harbor Beach, Mich.

Sebewaing Township—
No sand or gravel in township.

Segel Township—
Cook, Frank, Harbor Beach, R. F. D. No. 1, Mich.
Gentner, Peter, Harbor Beach, R. F. D. No. 1, Mich.
Gryates, Mrs., Harbor Beach, R. F. D. No. 1, Mich.
Smiser, Ferd, Harbor Beach, R. F. D. No. 1, Mich.

Sheridan Township—
Henley, Mrs. N. O., Bad Axe, No. 1, Mich.
McDonald, Dan J., Bad Axe, R. F. D. No. 8, Mich.
McIntosh, John S., Cass City, R. F. D., Mich.
Watson, Neil, Ubly, R. F. D. No. 2, Mich.

Sherman Township—
Owner unknown.

Ingham County:
Aurelius Township—
Couch, Charley, Mason, Mich.
Morton, L., Eaton Rapids, Mich.

Bunker Hill Township—
Bunker, Charles, Stockbridge, Mich.
Ryan, Robert, Leslie, R. F. D., Mich.

Lansing Township—
Breitenwischer, Lewis, 512 Oakland Blk., Lansing, Mich.
Stockman, Francis M., Lansing, R. F. D. No. 4, Mich.
Holbrook, John, Lansing, Mich.

Leroy Township—
DeWitt, Mrs. E., Webberville, Mich.
Lewis, Edd., Webberville, Mich.

Vevay Township—
Campbell, Hugh, 1515 Sixth St., Bay City, Mich.
Malcolm, Estate of Peter, Saginaw, Mich.
Nice, Geo., Mason, Mich.
Poots, Walter F., Mason, Mich.

Wheatfield Township—
Backe, A. C., Mason, Mich.
Convin, L., Williamston, Mich.
Goralin Est., D., Williamston, Mich.
Graves, Frank, Williamston, Mich.
Herald, Est., C., Dansville, Mich.
Linder, L., Williamston, Mich.
Owitz, G. H., Williamston, Mich.
Warner, W., Mason, Mich.

White Oak Township—
Brogan, John, Stockbridge, Michigan.
Clark, Will, Stockbridge, Mich.
Gillam, F. J., Stockbridge, Mich.
Green, Arthur, Dansville, Mich.
Hutson, Henry, Stockbridge, Mich.
Lantes, Clifford, Webbervflle, Mich.
McKimpy, DeBert, Stockbridge, Mich.
Rock, Nelson, Webberville, Mich.
Wimpel, (?), Dansville, Michigan.

Ionia County:
Berlin Township—
Dausman, Samuel, Saranac, Mich.
Foster, N. S., Saranac, Mich.
Hiserman, Herman, Lake Odessa, Mich.
Mills, John, Saranac, Mich.
Youngs, Marvin, Ionia, Mich.

Boston Township—
Bird, Charles, Saranac, R. F. D. No. 11, Mich.
Church, E. E., Clarksville, R. F. D. No. 48, Mich.
Grieves, Mrs., Saranac, R. F. D. No. 9, Mich.
Keyser, Charles, Saranac, R. F. D. No. 10, Mich.
Richmond, Arthur, Saranac, R. F. D. No. 12, Mich.

Campbell Township—
Hahn, Henry, Clarksville, Mich.
McCormick, Alva, Clarksville, Mich.
Scott, J. J., Clarksville, Mich.

Danby Township—
Barr, P. S., Portland, Mich.
Curry, J. B., Portland, Mich.

Dye, O. H., Portland, Mich.
Fos, F. A., Portland, Mich.
Pryor, F. W., Portland, Mich.
Smith, C. P., Portland, Mich.
Ferphagen, (?), Mulliken, Mich.

Ionia Township—
Crawford, Geo. W., Ionia, R. F. D. No. 3, Mich.
Emmons, E. J., Ionia, Mich.
Gardner, John, 346 Division St., Ionia, Mich.
Miller, Henry, East Main St., Ionia, Mich.
Ionia Cement Products Co., Ionia, Mich.

Odessa Township—
Amsworth, Thomas, Lake Odessa, R. F. D., Mich.
Fellows, James, Lake Odessa, R. F. D., Mich.
Lasher, John, Lake Odessa, R. F. D., Mich.
Llayle, Geo., Lake Odessa, R. F. D., Mich.
Koutz, Chas., Lake Odessa, R. F. D., Mich.
Van Houten, Archie, Lake Odessa, R. F. D., Mich.

Orleans Township—
Township own pits.

Ronald Township—
Bailey, John, Shiloh, Mich.
Burdick, Harlow, Ionia, R. F. D., Mich.
Hazelitt, J. J., Ionia, Mich.
Normington, Frank, Ionia, Mich.
Millard, Seymour, Palo, Mich.
Trowbridge, F., Ionia, Mich.
Warren, Mrs. Edward, Ionia, Mich.

Iosco County:
Alabaster Township—
Benson, John H., Alabaster, Mich.
Marsh & Co., Sandusky, Ohio.
U. S. Gypsum Co., 205 Monroe St., Chicago, Ill.

Plainfield Township—
Merchant, Frank, Hale, Michigan.
Plelipart, J., Hale, Michigan.
Reimer, Wm., Hale, Mich.

Reno Township—
Harding, Mr. N. C., Tawas City, Mich.
Market, Mr. F., Whittemore, R. F. D. No. 2, Mich.

Tawas Township—
Davison, Thomas, Tawas City, Mich.

Iron County:
Bates Township—
Oliver Iron Mining Co., (?).
Winton, Wilbur, Iron River, Mich.

Crystal Falls Township—
Kimball, Ray, Crystal Falls, Mich.

Iron River Township—
Chicago & N. W. R. R. Co., Chicago, Ill.

Mastodon Township—
No gravel or sand pits in the township.

Stambaugh Township—
Bergquist, Jake, Palatka, Mich.
Fitspatrick, Chas., Iron River, Mich.
Homes, H. Crystal Falls, Mich.
Saldon, W. H., Iron River, Mich.

Isabella County:
Chippewa Township—
Hook, M. E., Shepherd, Mich.
Shepherd, Wm., Shepherd, Mich.
Servoss, Dewitt, Mackinaw City, Mich.

Coe Township—
Clemens, A. F., St. Louis, R. F. D. No. 3, Mich.
Frost, J. R., Shepherd, R. F. D., Mich.
Leonard, H. E., St. Louis, R. F. D., Mich.
Myers, John Shepherd, R. F. D., Mich.

Deerfield Township—
Cross, E., Mt. Pleasant, Mich.
Art, John, Mt. Pleasant, Mich.
Davis, Geo., Mt. Pleasant, Mich.
Himebach, Geo., Mt. Pleasant, Mich.

Fremont Township—
Earl, Dass, Blanchard, Mich.
Foglesong, Henry, Shepherd, R. F. D. No. 1, Mich.
Livingston, Joseph, Riverdale, R. F. D. No. 1, Mich.
Taylor, Mrs. John, Mt Pleasant, R. F. D., Mich.

Isabella Township—
No pits in the township.

Lincoln Township—
Battles, John, Shepherd, Mich.
Coughlin, Will, Shepherd, R. F. D. No. 1, Mich.
Luce, Oscar, Shepherd, R. F. D. No. 1, Mich.
Merrills, Dudley, Shepherd, R. F. D. No. 1, Mich.
Miller, Roy, Shepherd, R. F. D. No. 1, Michigan.
Plat, W., Shepherd, Mich.
Willson, Geo., Shepherd, R. F. D. No. 1, Mich.

Nottawa Township—
Doll, Selvester, Rosebush, R. F. D., Mich.
Schafer, P., Rosebush, R. F. D., Mich.

Rolland Township—
Garrison, Stewart, Blanchard, Mich.
Moody, A. L., Blanchard, Mich.
Winans, Frank, Blanchard, Mich.

Veron Township—
McCandless, Mrs. J., Saginaw, Mich.

Wise Township—
Pits belong to township.

Jackson County:
Blackman Township—
Blake, J. E., Jackson, Mich.
Emmons, Wm. P., 123 Clinton St., Jackson, Mich.
Former, Joseph, Jackson. R. F. D. No. 4, Mich.
Holton & Weatherwax Co., Jackson, Mich.
Myers, Albert, R. F. D. No. 6, Jackson, Mich.
Smith, T., Jackson, R. F. D. No. 4, Mich.
True, H., Jackson, R. F. D. No. 3, Mich.
Wickwire, Harry, Jackson, R. F. D., Mich.

Columbia Township—
(?)

Hanover Township—
Cavanaugh, Wm., Horton, Mich.
Cooper, Alfred, Horton, Mich.

Henrietta Township—
Leeke, W. A., Munith, Mich.

Leoni Township—
Harr, Eleanor, Jackson, R. F. D. No. 2, Mich.
Michigan Central R. R. Co., Geo. H. Webb, Chf. Engr., Detroit, Mich.
Sager, E. A., Jackson, R. F. D. No. 9, Mich.
Todd, Miss Rosetta, Jackson, R. F. D. No. 9, Mich.

Libert Township—
Smith, Jefferson, Clarke Lake, R. F. D. No. 2, Mich.

Napoleon Township—
Alger, Harry Jackson, care of Commonwealth Power Co., Mich.
Blackmar, Chas., 107 Stewart Ave., Jackson, Mich.
Potter, K. L., Jackson City Bank, Jackson, Mich.
Tate, Geo., Jackson, Mich.

Rives Township—
Blood, Charlie, Rives Jct., R. F. D. No. 3, Mich.
Jones, W. J., Jackson, R. F. D. No. 3, Mich.

Sandstone Township—
Anderson, F. L., Parma, Mich.
Benn, C. E., Parma, Mich.
Chapel, Clarence, Parma, Mich.
Cochran, Chas., Parma, Mich.
Hunn, G. L., Parma, Mich.
Kress, Nick, Parma, Mich.
Sackrider, F. C., Jackson, R. F. D. No. 5, Mich.
Titus, C. Parma, Mich

Spring Arbor Township—
Roberts, Hiram, Concord, Mich.
Sanders, John, Horton, Mich.

Tompkins Township.
McArthur, Oscar, Rives Jct., R. F. D. No. 1, Mich.
Townley, M. C., Jackson, Mich.

Kalamazoo County.
Alamo Township—
Bennett, C. W., Alamo, P. O., Mich.
Brown, Ward, Plainwell, Mich.
Gunn, J. W., Watervliet, Mich.
Hughes, Byron, Otsego, Mich.
Hipp, Joseph, Alamo, P. O., Mich.
Kesinger, C. Otsego, Mich.
Miller, M. F., Alamo, Mich.
Myers, Fred, Alamo, Mich.
Pearce, Myron, Otsego, P. O., Mich.
Powell, J. C., Plainwell, Mich.
Riethkerk, L., Alamo, Mich.
Ransom, C., Alamo, Mich.
Russell, H. L., Alamo, Mich.
Shafer, W., Alamo, Mich.
Tallman, A.; Alamo, Mich.

Charleston Township—
Henderson Bros., Galesburg, Mich.
Miller, J. B., Augusta, Mich.

Climax Township—
Burgur, Martin, Climax, Mich.
Cramlin, Frank S., Climax, Mich.
Kay, Charles, Scots, Mich.
Tobey, Arch, Climax, Mich.

Kalamazoo Township—
Balch, Wm. A., 1425 Forbes St., Kalamazoo, Mich.
Balch, Uriel K., 1317 Summit Ave., Kalamazoo, Mich.
Buurma, Samuel H., 315-317 E. Frank St., Kalamazoo.
Haas, H. G., Kalamazoo, Mich.
Hall, G. D. B., Kalamazoo, Mich.
Huff, Archie, 109 E. Ramson St., Kalamazoo, Mich.
Klepper, Jacob, 1711 N. West St., Kalamazoo, Mich.
Lane & Lay, Kalamazoo, Mich.
Lane, M. H., Kalamazoo, Mich.
Leenhouts, Peter, Kalamazoo, Mich.
Molhark, Peter, Kalamazoo, Mich.
Newhouse, Jacob, 225 W. Washington St., Kalamazoo, Mich.
Owens, Michael, 833 Reed St., Kalamazoo, Mich.
Russell, Jas. T., 602 Maple St., Kalamazoo, Mich.
Speir, Samuel O., Wheaton Ave., Kalamazoo, Mich.

Oshtemo Township—
Gibbs, Martin, Ostemo, Mich.
Gunn, Dr., Ostemo, Mich.
King, Mr., Ostemo, Mich.
Myron, Frank, Ostemo, Mich.
Roop, Myron, Kalamazoo, Mich.
Stratton, Harry, Kalamazoo, Mich.

Portage Township—
Meredith, Warren, Kalamazoo, Mich.

Richland Township—
Chadderton, Emroy, Richland, Mich.
Laine, F. B., Kalamazoo, R. F. D., Mich.

Kalkaska County:
Boardman Township—
Hayward, W. F., South Boardman, Mich.
Stevens, Milton, South Boardman, Mich.

Clearwater Township—
Kerhpatrick, D. Reid, Rapid City, Mich.
Letherby, Mrs. John, Barker Creek, Mich.
Letherby, J. H. F., Barker Creek, Mich.
Manley, Chas., Rapid City, Mich.
Morrison, John, Rapid City, Mich.

Coldsprings Township—
No gravel in township.

Kalkaska Township—
Drake, John, Kalkaska, R. F. D. No. 2, Mich.
Murphy, Josiah, Kalkaska, R. F. D. No. 2, Mich.

Oliver Township—
Lewis Sands, S. L., Co., Manistee, Mich.

Orange Township—
Andrewson, Lind, Kalkaska, Mich.
Etzcorn, Peter, South Boardman, Mich.

Rapid River Township—
Besaw, Joseph, Mancelona, R. F. D. No. 3, Mich.
Wood, E. F., Rapid City, R. F. D. No. 2, Mich.
Antrim Iron Co., Mancelona, Mich.

Springfield Township—
Ingersoll, Nathan, Fife Lake, Mich.
Woodward, Mrs. J., Fife Lake, Mich.

Wilson Township—
Parker, Nelson, Kalkaska, Mich.

Kent County:
Ada Township—
Bogart, A., Ada, Mich.
Pettis, Edwin, Ada, Mich.

Algoma Township—
Beauchamp Bros., Edgerton, Mich.
Burleson, Harry, Cedar Springs, R. F. D., Mich.
Grant, Howard, Rockford, R. F. D. No. 27, Mich.
King, A. R., Sparta, R. F. D., Mich.
Turner, M. C., Rockford, R. F. D., Mich.
Sovelace, R. D., Rockford, R. F. D., Mich.

Alpine Township—
Deiss, Jos., Alpine, R. F. D. No. 17, Mich.
Reed, Percy, Alpine, Mich.

Cascade Township—
Fisher, J., McCords, Mich.
Holt, C. F., Ada, R. F. D. No. 42, Mich.
Linton, Geo., McCords, Mich.
Patterson, B. B., Ada, R. F. D. No. 42, Mich.
Scott, Ed., McCords, Mich.
Slater, R. J., Ada, R. F. D. No. 42, Mich.

Gaines Township—
Brewer, Earl, Byron Center, R. F. D., Mich.
Overholt, R., Dutton, R. F. D., Mich.
Pickett, J. W., Caledonia, R. F. D., Mich.
Ross, J., Ross, R. F. D., Mich.
Ryno, M. J., Ross, R. F. D., Mich.

Grand Rapids Township—
Battjes Fuel & Bldg., Mat. Co., Grand Rapids, Mich.
Bunker Co., G. W., Grand Rapids, Mich.
Byres, March, Grand Rapids, R. F. D. No. 6, Mich.
Conley, Wm., Grand Rapids, R. F. D., Mich.
Harrison Land Co., Ltd., Cor. Pine & 4th Sts., Grand Rapids, Mich.
Jansma, Fred, Gravel Co., 426 Walker Ave., Grand Rapids, Mich.
Michigan Sand & Gravel Co., 16 Hawkins Bldg., Grand Rapids, Mich.
Naysmith, Chas., Knap Ave., Grand Rapids, Mich.
Valley City Stone & Gravel Co., 19 West Broadway, Grand Rapids, Mich.
Van Der Veer & Kloate Gravel Co., Grand Rapids, Mich.

Nelson Township:
Farmer, Ruben, Sand Lake, Mich.
Keltz, Henry, Sand Lake, Mich.

Oakfield Township—
Bennett, Harmon, Harvard, R. F. D. No. 40, Mich.
Crawford, Thomas, Greenville, R. F. D. No. 2, Mich.
House, Bert, Lincoln Lake, R. F. D., Mich.
Lewis, George, Greenville, R. F. D. No. 2, Mich.
Maloney, Pat, Harvard, R. F. D. No. 40, Mich.
Smith, Geo., Harvard, R. F. D. No. 40, Mich.
Walbright, L., Wayland, Mich.
Ward, Michael, Harvard, Mich.
Wooster, Dell, Harvard, Mich.

Paris Township—
No pits in township.

Spencer Township—
Force, William, Harvard, Mich.
Gale, Geo., Sand Lake, Mich.

Tyrane Township—
Barrett, A. H., Kent City, Mich.
Clark, L., Kent City, Mich.
Hohngeen, E. A., Kent City, Mich.
Kregger, M., Kent City, Mich.

Wyoming Township—
Ide, D. K., Grandville, Mich.
Noel, Frank, Grandville, Mich.

Walker Township—
Butterfield, C. H., Grand Rapids, Mich.
Corporan, J., Grand Rapids, Mich.
Kepkey, F. D., Grand Rapids, Mich.
Sparp, A., Grand Rapids, Mich.

Keweenaw County:
Grant Township—
Keweenaw Copper Co., Calumet, Mich.
St. Mary Canal Co., Houghton, Mich.

Eagle Harbor—
Calumet & Hecla, Calumet, Mich.

Sherman Township—
Mandan (Delinquent).
Tamarack, Calumet, Mich.

Lake County:
Chase Township—
Eichenberger, H., Reed City, R. F. D., Mich.
Saunders, George, Chase, Mich.

Cherry Valley Township—
Lacy, Mrs. F. D., Nirvana, Mich.
Pinchon, J. M., Nirvana, Mich.
Lorce, Andrew, Nirvana, Mich.

Dover Township—
Anderson, Ed., Tustin, R. F. D. No. 1, Mich.
Bell, Edd., Tustin, R. F. D. No. 1, Mich.
Truman, Earl, Luther, R. F. D. No. 1, Mich.

Eden Township—
Irons, Geo., Irons, Mich.
Kosmata, Fr., Willow Springs, Mo.

Elk Township—
Griffes, E. B., Dublin, Mich.
Riggs, Fred, Irons, Mich.
Anderson, W. E., Youngstown, R. F. D. No. 1, Ohio.
Bortz, S. E., Millerton, Mich.
Myers, Frank, Sauble, Mich.
Seaman, W. A., Peacock, Mich.

Ellsworth Township—
Ceming, Al., Luther, Mich.
Schall, C. A., Luther, Mich.

Newkirk Township—
Buckner, S., Luther, Mich.
Rugles, Chas., Manistee, Mich.

Pinora Township—
Buckley & Douglas, Manistee, Mich.

Pleasant Plains Township—
Denis, Parson, Detroit, Mich.

Sweetwater Township—
Bosley, D., Branch, Mich.
London, C. H., Branch, Mich.
Stevenson, Mat., Branch, Mich.

Webber Township—
Miller, David, Baldwin, Mich.

Lapeer County:
Almont Township—
Angle, R. J., Almont, Mich.
Bishop, Frank, Almont, Mich.
Bristol, Geo. C., Almont, Mich.
Chandler, Leon F., Almont, Mich.
Gutchies, Julia, Almont, Mich.
Hallock, Roy P., Almont, Mich.
Messer, Geo., Almont, Mich.
Muir, Mrs. Gillis, Almont, Mich.
Muir, William, Dryden, Mich.
Welton, Chas., Imlay City, Mich.

Arcadia Township—
Clark, Ed., Lum, Mich.
Grinnell, Geo., Attica, Mich.
Schwerin, Fred, Kings Mill, Mich.

Attica Township—
Sumner, Luther, Attica, Mich.
Smith, Lee G., Attica, Mich.

Deerfield Township—
Bearss, Mrs. Joseph, Fostoria, Mich.
Burch, Geo. Fostoria, Mich.
Doeherty, Thomas, North Branch, Mich.
Frickie, Perry, North Branch, Mich.
Hunt, Marcellus, North Branch, Mich.
Main, Vernon, Flint, Mich.
Matthews, Geo., North Branch, Mich.
North West Lapeer, Mich. (Unknown.)

Elba Township—
Lassen, J. C., Lapeer, Mich.
Peterson, Wm., Lapeer, Mich.

Goodland Township—
Best, Wm., Imlay City, R. F. D. No. 1, Mich.
Churchill, Carey, Imlay City, R. F. D. No. 2, Mich.
McKillen, David, Brown City, Mich.
Yerex, W., Imlay City, R. F. D. No. 1, Mich.
Teeple, Geo., Imlay City, R. F. D. No. 1, Mich.
Young, Cash, Imlay City, R. F. D. No. 2, Mich.

Hadley Township—
Brocker, August, Goodrich, Mich.
Metun, Fred, Goodrich, Mich.

Imlay Township—
Donovan, Ed., Imlay City, Mich.
Phelp, Dayton, Imlay City, Mich.
Weyer, Albert, Imlay City, Mich.

Metamora Township—
Beardsley, F., Metamora, Mich.
Caley, M., Hunters Creek, Mich.
Coryell, M., Metamora, Mich.
Dudley, R. L., Metamora, Mich.
Gardiner, Robert, Metamora, Mich.
Gardiner, F., Metamora, Mich.
Linabury, A., Metmora, Mich.
Michael, C., Metamora, Mich.
Palmer, I., Metamora, Mich.
Snoier, S., Metamora, Mich.
Walker, J., Hunters Creek, Mich.

North Branch Township—
Frederick, Jno., North Branch, Mich.
Wilder, Glenn, Kings Mill, P. O., Mich.

Oregon Township—
Holcomb, A., Lapeer, Mich.
Rich, John T., Port Huron, Mich.
Spears, W. A., Columbiaville, Mich.

Rich Township—
Hall, Samuel, Silverwood, Mich.
Harris, Ernest, Fostoria, Mich.

Leelanau County:
Bingham Township—
Jissup, Linly, Bingham, R. F. D. No. 5, Mich.
Reinoki, Elmer, Suttons, R F. D. No. 2, Mich.

Centerville Township—
Swonson, Jr., P., Maple City, R. F. D. No. 1, Mich.

Empire Township—
Daly, E. R., Empire, Mich.
Dorconk, Alonzo, Empire, Mich.

Glen Arbor Township—
Bronson, Margaret, Maple City, R. F. D. No. 1, Michigan.
Day, D. H., Glen Haven, Mich.
Fisher, Edw., Glen Arbor, Mich.
Fisher, Fred, Glen Arbor, Mich.
Meredith, Edw., Glen Arbor, Mich.
Ray, W. C., Glenmere, Mich.
Walker, W. H., Traverse City, Mich.
Westcott, John, Glen Arbor, Mich.

Leelanau Township—
Johnson, Adolph, Northport, Mich.
Larson, Edward, Northport, Mich.
Mojay, Peter, Omena, Mich.
Morgan, N. C., Omena, Mich.

Leland Township—
Alpers, Herman, Suttons Bay, Mich.
Bossie, Henry, Provemont, Mich.
Egler, Henry, Suttons Bay, Mich.

Lenawee County:
Clinton Township—
Bruce, Marion C., Clinton, Mich.
Gillispie, R. P., Tecumseh, Mich.
Johnson, Frank, Clinton, Mich.
Miner, I., Clinton, Mich.
Smith, Porter C., Clinton, Mich.

Deerfield Township—
No sand or gravel in township.

Hudson Township—
Burnes, J., Hudson, Mich.
Bivins, H., Hudson, Mich.
Church, Will, Hudson, Mich.
Iler, H. J., Clayton, Mich.
Lowe, Frank, Hudson, Mich.
Lockwood, Sam, Hudson, Mich.
Moore, Geo., Hudson, Mich.
Zimmerman, Wm., Clayton, Mich.

Macon Township—
Crittenden, S., Saline, Mich.
Gilman, W. F., Tecumseh, Mich.
Howell, Mrs. J., Tecumseh, Mich.
Miller, Fred, Ridgeway, Mich.
Ransom, Geo., Ridgeway, Mich.
Ward, W. W., Ridgeway, Mich.

Medina Township—
Bailey, A., Morenci, Mich.
Colegrove, O. D., Morenci, Mich.
Cramer, Will, Hudson, Mich.
Evans, Geo., Morenci, Mich.

Raisin Township—
Baldwin, Will, Tecumseh, Mich.
Becker, Wm., Tecumseh, Mich.
Doty, S., Hollaway, Mich.
Fetzer, David, Hollaway, Mich.
Haight, Sam, Tecumseh, Mich.
Hoog, Ed., Tecumseh, R. F. D. No. 1, Mich.
Judson, V., Hollaway, Mich.
McIntyre, J. C., Hollaway, Mich.
Nyland, John, Tecumseh, Mich.
Raisin Township Pits.
Wilson, Ira, Tecumseh, R. F. D. No. 3, Mich.

Ridgeway Township—
Homman, C. F., Ridgeway, Mich.
Low, C. C., Britton, Mich.

Riga Township—
Robinson, Willard D., 250 Ohio Bldg., Toledo, Ohio.

Seneca Township—
Township Pits.

Tecumseh Township—
Grey, J. W., Tecumseh, Mich.
Hayden, Wm., Tecumseh, Mich.
Howard, A. O., Tecumseh, Mich.
Stacey, Mrs. G. N., Tecumseh, Mich.

Woodstock Township—
Porter, Mrs., Devils Lake, Mich.
Ryan, J. J., Adison, Mich.
Wilsey, Wm., Devils Lake, Mich.

Livingston County:
Cohoctah Township—
Greener, Luther, Howell, Mich.
Thomas, Henry, Oak Grove, Mich.

Conway Township—
Smith, J. E., Webberville, Mich.
Stow, W. E., Fowlerville, R. F. D. No. 1, Mich.

Hamburg Township—
Butler, Dwight, Hamburg, Mich.
Haight, B. N., Hamburg, Mich.

Hendricks, Myron, Hamburg, Mich.
Ohio & Michigan Sand Co., The, 1019 Nichols Bldg., Toledo, Ohio.
Roth, Geo., Chilson, Mich.

Handy Township—
Bowers, Ben., Fowlerville, Mich.
Briggs, Chet, Fowlerville, Mich.
Cole, Ben., Fowlerville, Mich.
Church, Bert, Fowlerville, Mich.
Nerington, Charles, Webberville, Mich.
Smith, Floyd, Fowlerville, Mich.
Wallace, Will, Fowlerville, Mich.

Hartland Township—
Armstrong, L. L., Brighton, Mich.
Crouse, J. B., Hartland, Mich.
Cundey, A., Brighton, Mich.
Kiltrider, Geo., Oak Grove, Mich.
Phipps, B., Oak Grove, Mich.
Tamlyer, Eli. Oak Grove, Mich.

Howell Township—
Crandel, Fred, Howell, R. F.. D. No. 5, Mich.
Deiterle, Clara, Howell, R. F. D. No. 8, Mich.
Filkins, D. J., Howell, R. F. D. No. 4, Mich.
Gats, Marion, Howell, R. F. D. No. 8, Mich.
Hasley, E. B., Howell, R. F. D. No. 9, Mich.
Munsell, S. H., Howell, R. F. D. No. 5, Mich.
Reed, E. C., Howell, Mich.
Reed, R. C., Howell, Mich.

Marion Township—
Michigan State Sanatorium, Howell, R. F. D. No. 2, Mich.
Ruttman Bros., Howell, R. F. D. No. 8, Mich.

Osceola Township—
Bramer, Rudolf, Howell, Mich.
Browning, John, Howell, Mich.
Hetchler, Albert, Howell, Mich.
Horley, E. B., Howell, Mich.
Walker, Thomas, Howell, Mich.

Putnam Township—
Briggs, Lyle, Pinckney, Mich.
Hinchey, Chester, Pinckney, Mich.
Monks, Alfred, Pinckney, Mich.
Mowers, George, Pinckney, Mich.
Tupper, Willis, Pinckney, Mich.

Tyrone Township—
Bartelle, August, Fenton, R. F. D. No. 5, Mich.
Brown, Mr., Fenton, R. F. D. No. 2, Mich.
Chamberlain, Clyde, Grand Rapids, Mich.
Cornell, George, Fenton, R. F. D. No. 3, Mich.
Cullen, Mrs. John, Fenton, Mich.
Gates, Elmer, Fenton, R. F. D. No. 2, Mich.
Hogan, John, Fenton, R. F. D. No. 3, Mich.
Love, Daniel C., Fenton, R. F. D. No. 5, Mich.
McHugh, Edward, Fenton, Mich.
Mehlbery, Ira, Fenton, R. F. D. No. 2, Mich.
Morehouse, William, Fenton, Mich.
Reed, Armstrong, Fenton, R. F. D. No. 2, Mich.
Skidmore, Corwin, Fenton, R. F. D. No. 4, Mich.
Thompson, Clark, Fenton, Mich.
Thompson, Harry, Fenton, R. F. D. No. 2, Mich.
Tarnham, Henry, Fenton, R. F. D. No. 3, Mich.
Warden, A. J., Fenton, R. F. D. No. 3, Mich.
Wolverton, Bert, Fenton, R. F. D. No. 3, Mich.

Unadilla Township—
Arnold, O. B., Gregory, Mich.
Castill, James, Pinckney, Mich.

Luce County:
Pentland Township—
Township Pit.

Mackinaw County:
Bois Blanc Township—
No sand and gravel in township.

Hendricks Township—
Berry, Joseph, Rexton, (?), Mich.

Hudson Township—
Enkema, A., Security Bank Bldg., Minneapolis, Minn.
Graunstadt, F. J., Garnet, Mich.
Hudson Lumber Co., Garnet, Mich.
Lake Superior Iron & Chemical Co., (?).
Union Carbide Co., Soo, Mich.

Marquette Township—
Leach, Hugh, Pickford, Mich.
Wise, Fred W., Pickford, Mich.

Newton Township—
Escanaba Lumber Co., Escanaba, Mich.
McEachern & Sons, A., Gould City, Mich.
Wisconsin Land & Lumber Co., Hermansville, Mich.
Western Land Securities Co., St. Paul, Minn.
McArthur, Duncan, Gould City, Mich.

Portage Township—
Escanaba Lumber Co., Escanaba, Michigan.
McCalpire, Sol, Curtis, Mich.

Macomb County:
Armada Township—
Henderson Gravel Co., The, 412 Weadock Bldg., Saginaw, Mich.
Spencer, C., Allington, Mich.

Chesterfield Township—
Bates, W., New Baltimore, Mich.
Crawfort, A., New Haven, Mich.
Crittenton, Frank, Mt. Clemens, Mich.

Clinton Township—
Lake Side Ice & Coal Co., Mt. Clemens, Mich.
Wacker, H. Jacob, Rose St., Mt. Clemens, Mich.

Jasper Township—
Get their sand and gravel from Coe Twp. Isabella County.
Lenard, H. E., St. Louis, Mich.
Frost, J. H., Shepherd, Mich.

Lenox Township—
Harder, Henry, Richmond, Mich.

Ray Township—
Keitchenmeister, Chas., New Haven, R. F. D., Mich.
Thompson, Wm., Romeo, R. F. D. No. 5, Mich.

Richmond Township—
Farr, Mrs. Elma, Richmond, Mich.
Hall, R. R., Richmond, Mich.
Hawkins, Elsworth, Richmond, Mich.
McGuffin, Wm., Memphis, Mich.
Pratt, Benj., Armada, Mich.
Spencer, James, Armada, Mich.

Shelby Township—
Detroit Sand & Gravel Co., 34 McGraw Bldg., Detroit, Mich.
Dull, J., Rochester, Mich.
Houghton, H., Detroit, Mich. (806 Hammond Bldg.)
Little, C. H., Detroit, Mich.
Superior Sand & Gravel Co., Utica, Mich.
Swartz, Fred, Washington, Mich.

Sterling Township—
Couchez, Bruno, Mt. Clemens, Mich.
Savedore, J., Utica, R. F. D. No. 2, Mich.
Seiferlein, George, Warren, Mich. (Sterling Twp. ?).
Schroeder, Herman, Warren, Mich. (Sterling Twp. ?).

Warren Township—
No gravel pits in township.

Washington Township—
McKinney, Mrs. L., Washington, Mich.
Stewart, Byron, Romeo, Mich.

Manistee County:
Arcadia Township—
Boss and Johnson, Bear Lake, R. F. D., Mich.
Gilroy, Elias, Elberta, Mich.
Gingrich and Rubel, Arcadia, Mich.
Nelson, Parrett, Bear Lake, R. F. D., Mich.
Putney, V. L., Arcadia, Mich.
Putney, O. E., Arcadia, Mich.
Stuart, Aca, Arcadia, Mich.
St. Pierre, (?).

Bear Lake Township—
Johnson, John, Chief, Mich.
Haphens, H., Bear Lake, Mich.

Brown Township—
Hanson, Mrs. Hannah, Norwalk, Mich.
Potter, Wm., Chief, R. F. D. No. 1, Mich.

Cleon Township—
Camell, H. S., Copemish, R. F. D. No. 2, Mich.
Fox, Wm., Copemish, R. F. D. No. 2, Mich.
Griner, S. J., Pomona, Mich.
Rogers, H. S., Copemish, R. F. D., Mich.
Steves, Frank, Pomona, Mich.
Tallor, A., Copemish, R. F. D., Mich.
Williams, Burt, Copemish, R. F. D., Mich.

Dickson Township—
Commonwealth Power Co., Grand Rapids, Mich.
Hibbs, Wm., Brethren, Mich.

Filer Township—
Filer, E. G., Filer City, Mich.
Hubbell Sand Co., Manistee, Mich.
Miller Bros. & Co., Manistee, Mich.
Summerfield, Port M., 290 N. Water St., Manistee, Mich.

Maple Grove Township—
Heidorn, Arnold, Kaleva, Mich.
Larsen, Ludwig, Kaleva, Mich.
McMartin, Charles, Chief, R. F. D. No. 2, Mich.
Milks, D. T., Kaleva, Mich.

Marilla Township—
Barnhart, Copemish, R. F. D. No. 1, Mich.
Evens, Wm., Copemish, R. F. D. No. 1, Mich.
Homes, M. S., Copemish, R. F. D., No. 1, Mich.
Reom, Wm., Copemish, R. F. D., No. 1, Mich.

Onekama Township—
Farr, M. A., Onekama, Mich.
Lang, Robert, Bear Lake, R. F. D., Mich.

Marquette County:
Champion Township—
C. & N. W. Ry. Co., (?)
Champion Iron Co. (?)

Ishpeming Township—
Cleveland Cliffs Iron Co., Ishpeming, Mich.
Snell, Isaac, Ishpeming, Mich.

Marquette Township—
Cleveland Cliffs Iron Co., Negaunee, Mich.

Michigamme Township—
Not known.

Negaunee Township—
No pits in the township.

Republic Township—
Sand and gravel in township but pits not opened up and owners not given.
Kloman Iron Co., Republic, Mich.
Republic Iron Co., Republic, Mich.

West Branch Township—
June, Mrs. E. M., Skandia, Mich.
Libby, Forrest D., Skandia, Mich.

Mason County:
Amber Township—
Barclay, Frank, Scottville, Mich. (R. F. D. No. 3.)
Beebie, Bert, Ludington, R. F. D. No. 2, Mich.
Fitch, Marion, Scottville, R. F. D. No. 3, Mich.
Peterson, Andrew, Ludington, R. F. D. No. 2, Mich.
Tenson, Ben., Ludington, R. F. D. No. 2, Mich.

Branch Township—
Dodge, C. C., Tallman, Mich.
Dunbar, H. E., Tallman, Mich.
Edmonson, James, Tallman, Mich.
Foster, C. J., Scottville, Mich.
Landon, C. H., Branch, Mich.

Custer Township—
Briggs, E. M., Custer, Mich.
Quick, J., R. F. D. No. 1, Custer, Mich.
Slagel, J., R. F. D. No. 2, Custer, Mich.

Eden Township—
Clark, Henry, Ludington, Mich.
Ferry, Fred, Pentwater, Mich.
Hall, Ed., Custer, R. F. D. No. 2, Mich.
Saxton, Wm., Custer, R. F. D. No. 2, Mich.

Freesoil Township—
Nippress, Wm. E., Freesoil, Mich.

Grant Township—
Szymanski, George, Freesoil, R. F. D. No. 2, Mich.
Wair, John, Freesoil, R. F. D. No. 2, Mich.

Hamlin Township—
Beaune, Oliver, Ludington, R. F. D., Mich.
Homer, W., Ludington, Mich.

Sheridan Township—
Loftis, John, Fountain, Mich.
Snellenburgh, John, Bachelor, Mich.

Victory Township—
Edwards, F. E., Scottville, R. F. D. No. 4, Mich.

Mecosta County:
Aetna Township—
Benson, Anto, Morley, Mich.
Moore, C. S., Morley, Mich.

Big Rapids Township—
Conard, R. F. D. No. 3, Big Rapids, Mich.
Conklin, Wm., Big Rapids, Mich. (114 P. M. Street).
Wright, D., Big Rapids, Mich.

Chippewa Township—
Carmicheal, Ed., Evart, R. F. D. No. 1, Mich.
Hodges, John, Evart, R. F. D. No. 1, Mich.

Colfax Township—
Gadner, Mrs., T. C., Big Rapids, Mich.
Granger, A. T., Big Rapids, Mich.
Larson, Oscar, Big Rapids, Mich.

Deerfield Township—
Barber, W., Morley, R. F. D. No. 2, Mich.
Branch, O., Morley, Mich.

Fork Township—
Chamberlin, D. W., Barryton, Mich.
Langley, E., Barryton, R. F. D. No. 1, Mich.

Grant Township—
Frieberg, Charles, Big Rapids, R. F. D. No. 4, Mich.
Stone, Charles E., Hersey, R. F. D. No. 1, Mich.

Martiny Township—
Adams, W. F., Mecosta, Mich.
Johnzen, Wm., Rodney, Mich.
Kempee, W. S., Rodney, Mich.

Millbrook Township—
Allen, Lenden, Blanchard, R. F. D. No. 2, Mich.
Picket, S., Millbrook, R. F. D. No. 2, Mich.
Riley, Ed., Millbrook, R. F. D. No. 2, Mich.

Sheridan (?).
Creavy, Chas., Remus, R. F. D. No. 2, Mich.
Shanks, William, Barryton, Mich.

Wheatland Township—
Windling, Jacob, Remus, Mich.

Menominee County:
Harris Township— (?)
Charboneau, Frank, Perronville, Mich.
Mashek Lumber Co., Escanaba, Mich.
Marsicek, Frank, Wilson, Mich.
Machina, Louis, Wilson, Mich.
Perron, M., Perronville, Mich.
Saindon, Chas., Perronville, Mich.
Schoen, Jno. A., Wilson, Mich.
Vian Bros., Bark River, R. F. D. No. 2, Mich.

Ingallston Township—
Allgyer, F., Wallace, Mich.
Erickson, Peter E., Wallace, Mich.
Limon, Henry, Wallace, Mich.
Ritmeyer, Alicke, Ingalls, Mich.

Menominee Township—
Burchgeaf, Jos., Menominee, Mich.
Cook, C. T., Menominee, Mich.
Hechel, Wm., Menominee, Mich.
Osborn, J. W., Wallace, Mich.

Millen Township—
Schuette, E. E., Wallace, Mich.
Smith, Geo. M., Wallace, Mich.
Stralow, Emil, Ingalls, Mich.

Myers Township—
Kent & Burg, Menominee, Mich.
Wis. L. & L. Co., Hermansville, Mich.

Stephenson Township—
Chicago & N. W. R. R. Co., Chicago, Ill.

Midland County:
Geneva Township—
McDonald, M., Coleman, Mich.

Hope Township—
No sand or gravel in township.

Ingersoll Township—
Bailey, Eli, Midland, Mich.
Curry, W. F., Midland, Mich.
Johnson, Dr., Midland, Mich.

Larkin Township—
Cheski, Fritch, Midland, R. F. D. No. 1, Mich.
Gehoski, Mike, Midland, R. F. D. No. 1, Mich.

Lee Township—
No sand or gravel in township.

Lincoln Township—
No sand and gravel in township.

Mills Township—
Gordon & Maxwell, Midland, Mich.
Troyer, D. J., Brier, Mich.

Porter Township—
Kinkade, David, Wheeler, R. F. D. No. 3, Mich.
Stinson, Geo., Merrill, R. F. D., Mich.

Warren Township—
Ferguson, Wm., Coleman, Mich.
Love, M., Coleman, Mich.

Missaukee County:
Aetna Township—
Armstead, W., Dinca, Mich.
Hamel, Louis, Lake City, Mich.
Minthorn, Wm., Lake City, Mich.
Stevens, Frank, Lake City, Mich.

Bloomfield Township—
Finley, L., Manton, R. F. D. No. 5, Mich.
Stauffer, J. W., Manton, R. F. D. No. 5, Mich.

Caldwell Township—
Austin, Ed., Manton, Mich.
Mitchell Bros. Co., Cadillac, Mich.

Forest Township—
Dicker, J. W., Lake City, Mich.
Foss, Fred, Lake City, Mich.
Laurance, Geo., Lake City, Mich.
Wood, Geo. W., Lake City, Mich.

Lake Township—
No pits in township.

Pioneer Township—
Eubanks, John, Lake City, Mich.
Mitchell Bros. Co., Cadillac, Mich.

Richland Township—
Merchwo, (?), D. G., Cadillac, Mich.
Richland township pits.

Riverside Township—
Bain, Wm., McBain, Mich.
Herwire, Leonard, Marion, R. F. D. No. 1, Mich.
Spears, E., McBain, Mich.
Whitney, H., McBain, Mich.

West Branch Township—
Pickering, J., Lake City, Mich.
Stitt, J., Lake City, Mich.

Monroe County:
Bedford Township—
Houck, (?), Lambertville, Mich.
Lecklock, (?), Samaria, Mich.
Nagar, R. H., Samaria, Mich.
Thorn, (?), Temperance, Mich.
Wilson, (?), Temperance, Mich.

Frenchtown Township—
Stoeckart, Wm., Monroe, Mich.
National Silica Co., 1009 Union Trust Bldg., Detroit, Mich.

Ida Township—
No pits in township.

Milan Township—
No sand and gravel in township.

Raisinville Township—
No sand and gravel in township.

Montcalm County:
Bloomer Township—
Bolinger, J., Carson City, Mich.
Bloomer Township Pits, Carson City, Mich.
Hoders, A., Hubbardston, Mich.

Cato Township—
Allen, Frank L., Lakeview, Mich.
Buckholtz, William, Lakeview, Mich.
Edgar, Wallace, Lakeview, Mich.
Grames, Andy B., Lakeview, Mich.
Jamison, William, Lakeview, Mich.
Macomber & Bale, Lakeview, Mich.
Orr, William D., Lakeview, Mich.
Robbins, Wilber, Lakeview, Mich.
Stewart, Fred V., Lakeview, Mich.

Crystal Township—
Ball, R. R., Carson City, Mich.
Finkbinder, Squire, (of the state of Washington.)
Loucks, Stephen, Carson City, R. F. D. No. 1, Mich.
Powell, Albert, Vickeryville, Mich.
Tissue, Lenn, Stanton, R. F. D. No. 1, Mich.
Sinkey, Mrs. L. M., Carson City, Mich.
Trimm, Levi, Crystal, R. F. D. No. 1, Mich.

Douglas Township—
Cross, Chas., Stanton, R. F. D. No. 1, Mich.
Comden, S. J., Stanton, R. F. D. No. 1, Mich.
Gordon, Mr., Stanton, R. F. D. No. 1, Mich.
Van Patten, Fred, Stanton, R. F. D. No. 1, Mich.
Wilson, Geo., Stanton, R. F. D. No. 1, Mich.

Eureka Township—
Snyder, A. J., Greenville, Mich.
Vandevere, W. R., Greenville, Mich.

Fairplains Township—
Hansen, Has L., Greenville, R. F. D., No. 1, Mich.
Potter, Roy, Greenville, R. F. D. No. 1, Mich.
Worden, Tom, Fenwick, Mich.

Ferris Township—
Cole, Martin, Stanton, Mich.
Douglass, Al., Vestaburg, Mich.
Griffin, Charles, Elm Hall, Mich.
Norris, Charles, Elm Hall, Mich.
Scott, Frank, Vestaburg, Mich.

Home Township—
Fowle, Delos A., Stanton, Mich.
Peterson, C. C., Edmore, Mich.
Williams, E. O., Edmore, Mich.

Montcalm Township—
Ehlert, Fred J., Gowen, Mich.
Hansen, L. P., Gowen, Mich.
Oliver, Geo., Gowen, Mich.
Rasmussen, Oscar, Gowen, Mich.
Skinner, Oscar, Gowen, Mich.

Pierson Township—
Baezwinkle, Wm., Pierson, Mich.
Cramers, H. J., Pierson, Mich.
Matz, Chas., Pierson, Mich.

Pine Township—
Gibby, John, Stanton, R. F. D. No. 3, Mich.
McConnel, John, Stanton, R. F. D. No. 3, Mich.
Peckham, A. C., Greenville, R. F. D. No. 3, Mich.
Williams, Joe, Lake View, R. F. D. No. 2, Mich.

Reynold Township—
Gee, T., Morley, R. F. D. No. 3, Mich.
Perrish, Chas., Grand Rapids, Mich.

Richland Township—
Nickeson, Geo., Vestaburg, Mich.
Richland township pits, Vestaburg, Mich.
Ward, W. E., Vestaburg, Mich.

Sidney Township—
Flenery, John, Sheridan, R. F. D. No. 1, Mich.
Hansen, Peter, Sidney, Mich.

Winfield Township—
Hiembecker, C., Howard City, R. F. D. No. 3, Mich.
Paulson, Bradie, Amble, Mich.

Montmorency County:
Albert Township—
No pits in township.

Avery Township—
Ellsworth, W. O., Hillman, Mich.
Smith, C. B., Atlanta, Mich.

Hillman Township—
Hunt, R. J., Hillman, Mich.
Wright, Eligh, Hillman, Mich.

Muskegon County.
Casnovia Township—
Bettis, Philo, Ravenna, R F. D., Mich.
Gilbert, H., Casnovia, R. F. D., Mich.
Hommer, Wm., Ravenna, R. F. D., Mich.

Holton Township—
No sand and gravel in township.

Laketon Township—
Burns, C. C., Muskegon, R. F. D. No. 8, Mich.

Montague Township—
Baxter, William, Montague, Mich.
Gurnar, Paul, Montague, Mich.
Smith, S., Montague, Mich.
Sumner, George, Montague, Mich.
Mears Estate, (†).
Vanderpils, John, Whitehall, Mich.

Newaygo County:
Beaver Township—
Bayle, M., Bitely, R. F. D. No. 1, Mich.
Conley, James, Bitely, R. F. D. No. 1, Mich.
Dake, Gilbert, Hesperia, R. F. D. No. 5, Mich.
Giddings, A., Hesperia, R. F. D. No. 5, Mich.
Harding, Mose, Hesperia, R. F. D. No. 5, Mich.
Larney, Bert, Hesperia, R. F. D. No. 5, Mich.
Mullmux, Jas., Bitely, R. F. D. No. 1, Mich.
Tarney, Norrah, Hesperia, R. F. D. No. 5, Mich.

Big Prairie Township—
Hartman, Aron, Newaygo, Mich.
Wall, John, Newaygo, Mich.

Bridgeton Township—
Scott, J. W., Bridgeton, Mich.
Valley, Edward, Twin Lakes, Mich.

Brooks Township—
Muskegon Power Co., G. R., Grand Rapids, Mich.
Shick, Edwin, Newaygo, R. F. D. No. 2, Mich.

Croton Township—
Galvester, Geo. (?)
Griffin, Malvin, (?).
Hall, A. E., (?).
Tennwitz, Joseph, (?).

Dayton Township—
Dykman, Nick, Fremont, Mich.
Hast, Chas., Brunswick, Mich.
Westenfelder, Edward, Fremont, Mich.

Denver Township—
Buhon, Henry, Fremont, R. F. D. No. 2, Mich.
Maynard, John, Fremont, R. F. D. No. 2, Mich.

Ensley Township—
Anderson, J., Sand Lake, R. F. D. No. 35, Mich.
Chambers, B., Wayland, Mich.
Cochran, R., Sand Lake, R. F. D. No. 36, Mich.
Dickerson, J., Sand Lake, R. F. D. No. 35, Mich.
Pratt, J., Howard City, R. F. D. No. 1, Mich.
Randal, M., Sand Lake, R. F. D. No. 35, Mich.

Goodwell Township—
Gerst, Roy, Woodville, R. F. D. No. 1, Mich.
Gergan, Gust, Handwood, R. F. D. No. 1, Mich.
Hutzman, Jacob, Whitecloud, R. F. D. No. 2, Mich.
Nestle, Christ, White Cloud, Mich.
Scott, Arthur, Woodville, R. F. D. No. 1, Mich.

Grant Township—
Nieboes, J. Grant, Mich.
Raymond, D. J., Grant, Mich.

Home Township—
Jackson, Geo. A., Otia, Mich.
Peters Lumber Co., (?), Cincinnati.

Lilley Township—
Ford, Kirk, Bitely, Mich.
Higly, Charley, Bitely, Mich.

Lincoln Township—
Archer, F., White Cloud, Mich.
McGong Co., W., Somomauk, Ill.
Township pits.

Norwich Township—
Fisher, Harry, Woodville, R. F. D. No. 1, Mich.
Seth, Jacob, Woodville, R. F. D. No. 1, Mich.
Smith, Jas., Woodville, R. F. D., Mich.
Turner, Delbert, Woodville, R. F. D., Mich.
Wentlen, Mrs., Woodville, R. F. D., Mich.

Sheridan Township—
Stone, Elwin, Freemont, Mich.
Township pits, Freemont, Mich.

Oakland County:
Avon Township—
Heal, Geo., 669 Baker St., Detroit, Mich.
Michigan Builders Supply Co., 520 Forest St. E., Detroit, Mich.

Bloomfield Township—
Caswell, Jas., Birmingham, Mich.
Dawson, George, Birmingham, Mich.
Forman, G., Birmingham, Mich.
Gorden, Walker, Birmingham, Mich.
George, Edwin S., Pontiac, R. F. D. No. 3, Mich.
Harbison, Frank, Birmingham, Mich.
Park, A., Birmingham, Mich.
Rockwell, C., Pontiac City, Mich.

Commerce Township—
Alliot, W., Milford, Mich. (?)
Cheeseman, A. E., Milford, Mich. (?)
Crumb, C., Walled Lake, Mich. (?)
Fuller, Ema, Milford, Mich.
Sleeth, Fred, Milford, Mich.
Taylor, J. D., Walled Lake, Mich.

Farmington Township—
Coleman, O., Farmington, Mich.

Conray, E., Farmington, Mich.
Ely, C., Farmington, Mich.
Francis, (?), Farmington, Mich.
Graham, J., Farmington, Mich.
Grummer, E., Farmington, Mich.
Hatten, C., Farmington, Mich.
Stodgel, E., Farmington, Mich.

Groveland Township—
Campbell, John, Ortonville, R. F. D. No. 2, Mich.
Hankinson, J. P., Holly, R. F. D., Mich.
Howe, Jerome, Holly, R. F. D., Mich.
Jones, Seth, Clawson, Mich.
Mills, Fred, Ortonville, Mich.
Warden, Rob, Holly, Mich.

Highland Township—
Armstrong, Clarence, Highland, Mich.
Barrett, A. G., Clyde, Mich.
Feeney, John, Highland, Mich.
Hewitt, P., Highland, Mich.
P. & M. Railroad, Highland, Mich.
Rogers, T., Clyde, Mich.

Holly Township—
Donovan, Mrs. Thomas, Fenton, R. F. D. No. 4, Mich.
Fish, E., (?).
Green, T. H. (?).
Hadden, Mrs. R. E. (?).
Hadley, D. D., Holly, Mich.
Haddis, P., (?).
Hadley, F. L., (?).
Lindsay, John, (?).
Marsh, Elmer, (?).
Mitchell, D. W., (?).
Mitchell, E., (?).
Osmun, H., (?).
Patterson, S. D., (?).
Selly, Mr., (?).

Independence Township—
Merdian Co., The Henry, 616 Moffat Bldg., Detroit, Mich.
Michigan Portland Cement Pav. Co., Rm. 92, Griswold St., Detroit, Mich.

Lyon Township—
Cox, Charley, South Lyon, Mich.
Fisher, D., New Hudson, Mich.
Hunter, L. R., New Hudson, Mich.
Marshall, Mary, South Lyon, Mich.

Milford Township—
Gordon, J., New Hudson, Mich.
Milford & Nixon, New Hudson, Mich.
Pittenger, Cas., New Hudson, Mich.
Rice, E. J., New Hudson, Mich.

Pontiac Township—
Anderson, Frank B., Pontiac, Mich.
Bartlett, R., Pontiac, Mich.
Howarth, Chas., Pontiac, Mich.
Hortung, Chas., Pontiac, Mich.
Kemp, W. H., Pontiac, Mich.
Rockwell, C. L., 180 Franklin Road, Pontiac, Mich.
Stanley, C., Pontiac, Mich.
Ward, Henry C., Pontiac, Mich.

Rose Township—
Demode, A. Y., Fenton, Mich.
Lake, Howard, Holly, Mich.
Sutton, N. B., Rose, Mich.
Wolf, W. Y., Holly, Mich.

Springfield Township—
Galligar, L., Clarkston, Mich.
Ellis, W. J., Clarkston, Mich.
Virgin, Ben, Lanisburg, Mich.
Walls, Fred, Lanisburg, Mich.

Troy Township—
Donaldson, John, Birmingham, R. F. D., Mich.
Groves, Robert, Birmingham, R. F. D., Mich.
Hadsell, C. E., Troy, Mich.
Howarth, Chas., Birmingham, R. F. D., Mich.
Moore, Roy, Troy, R. F. D., Mich.
Parks, Chas., Birmingham, R. F. D., Mich.

Waterford Township—
Brown & Brown Coal Co., Detroit, Mich.

Oceana County:

Benona Township—
Bartish, G., (?).
Bird, Frank, Shelby, R. F. D. No. 2, Mich.
Gaff, L. A., (?).
Hines, H. S., (?).
Hodge, Frank, (?).
Kelleg, Thos., (?).
Roth, Will, (?).
McVay, Anna, Shelby, R. F. D. No. 2, Mich.
Satterlie, Wm., (?).
Esley, George, (?).

Clay Banks Township—
Harlson, A., Shelby, R. F. D., Mich.
Jackson, C. J., Montague, R. F. D. No. 5, Mich.

Crystal Township—
Aldrich, A. O., Crystal Valley, Mich.

Elbridge Township—
Hart Cedar and Lumber Co., Hart, Mich.
Tompson, J. R., Hart, Mich.
Trometer, Hart, Mich.

Golden Township—
Ling, H. W., Mears, Mich.

Grant Township—
Myres, Carl, Rothbury, R. F. D. No. 1, Mich.
Wherle, Frank, Rothbury, R. F. D. No. 1, Mich.

Hart Township—
Fisher, John, Hart, R. F. D. No. 4, Mich.
Hale, Robert, Hart, Mich.
Noret, E. A., Hart, Mich.
Shinn, O. W., Hart, R. F. D. No. 1, Mich.

Leavitt Township—
No names given or pits.

Newfield Township—
Township of Newfield pits, Hesperia, Mich.
Village pit, Hesperia, Mich.

Otto Township—
Cartright, Thomas, Rothbury, R. F. D. No. 1, Mich.
Midlecamp, John, Rothbury, R. F. D. No. 1, Mich.

Pentwater Township—
Burington, Andy, Pentwater, Mich.
Mears, Miss Carrie, Chicago, Illinois.

Shelby Township—
Hobby, H. B., Shelby, R. F. D. No. 6, Mich.

Osceola County:

Cedar Township—
Owner of pits unknown.

Comins Township—
(?)

Evart Township—
Evart township pits, Evart, Mich.
White & Day, Evart, Mich.

Hersey Township—
Woodward, Carl, Hersey, Mich.
Woodward, Lew, Hersey, Mich.

Highland Township—
Beebe, C. M., Marion, R. F. D. No. 3, Mich.
Fralick, A., Tustin, Mich.
George, Perry, Marion, R. F. D. No. 1, Mich.
Vanderhoof, D., Marion, R. F. D. No. 3, Mich.

LeRoy Township:
Powers, Hurlon, LeRoy, Mich.
Johnson, Chas., LeRoy, R. F. D. No. 1, Mich.

Lincoln Township—
Hoogerhide, Jno., Reed City, R. F. D. No. 6, Mich.
Parkhurst Bros., Reed City, Mich.

Marion Township—
Johnson, Thos., Marion, R. F. D. No. 3, Mich.
Wise, John, Marion, R. F. D. No. 3, Mich.

Orient Township—
Flickinger, Jacob, Sears, Mich.
Hoff, H. H., Sears, Mich.

Osceola Township—
Clark, Ward, Evart, Mich.
Schamholtz, Henry, Evart, Mich.

Sherman Township—
Feland, Oscar, Tustin, R. F. D. No. 2, Mich.
Kunan, Henry, Dighton, Mich.
Marvin, Seymore, Tustin, R. F. D. No. 2, Mich.
Mint, John, Dighton, Mich.
Syers, Williard, Tustin, R. F. D. No. 2, Mich.

Sylvan Township—
Tahnstock, O., Carlton, Mich.

Ogemaw County:
Churchill Township—
Lathrop, Joseph, Selkirk, Mich.
Parlement, Ray, Selkirk, Mich.
Walker, G. E., Selkirk, Mich.

Klacking Township—
Bartells, Chas., Rose City, Mich.
Beetz, Chris., West Branch, R. F. D. No. 3, Mich.
Maclees, Leonard, Rose City, Mich.
Slater, Erwin, Rose City, Mich.

Logan Township—
Breach, John, Prescott, R. F. D. No. 2, Mich.
McKean, Albert, Detroit, Mich.
Schegdell, Chas., Prescott, R. F. D. No. 2, Mich.

Richland Township—
Adams, Milt, Prescott, Mich.
Drew, Semin, Prescott, Mich.
Edwards, John, Prescott, Mich.
Prescott, C. H., Prescott, R. F. D. No. 1, Mich.
Ward, Robert, Prescott, Mich.

Rose Township—
Brooks, H. F., Rose City, Mich.
Fletcher, Joe, Ausable, Mich.
Vaughn, Clinton, Lupton, Mich.

West Branch Township—
Depue, Mont, R. F. D. No. 3, West Branch, Mich. (?)
Harvey, D., R. F. D. No. 1, West Branch, Mich.
Newelecbue, (?) Peter, Campbell's Corner, R. F. D. No. 2, Mich.
Quackbush, L., West Branch, R. F. D. No. 3, Mich.

Ontonagon County:
Bohemia Township—
No sand and gravel in township.

Bergland Township—
Finley, John, Bergland, Mich.
Longyear, J. M., Marquette, Mich.

Haight Township—
Lee, Chas., Bruce Crossing, Mich.
Jenkins, J. B., Bruce Crossing, Mich.

Ottawa County:
Allendale Township—
Boush, Will, Grand Haven, R. F. D. No. 1, Mich.
Brinks, Henry, Allendale, Mich.

Blendon Township—
No sand and gravel in township.

Chester Township—
Bunce, C. W., Casnovia, Mich.
Mansfield, Henry, Conklin, R. F. D., Mich.
Wilkeson, Albert, Conklin, R. F. D., Mich.

Crockery Township—
Gleason, Oliver, Nunica, Mich.

Grand Haven Township—
No sand and gravel in township.

Holland Township—
Boone, Egbert, Holland, R. F. D. No. 10, Mich.
Kamps, Albert, Holland, R. F. D. Mich.
Lennon, B., Holland, R. F. D., Mich.
Stegeman, J., Holland, R. F. D., Mich.

Jamestown Township—
DeWard, John H., Hudsonville, R. F. D. No. 4, Mich.

Polton Township—
Harmsew, Herman, Coopersville, Mich.
Luben, Gert, Coopersville, Mich.

Robinson Township—
Graham, Mrs. T., Grand Haven, R. F. D. No. 3, Mich.
Hecksall, Mr. Wm., Grand Haven, R. F. D. No. 1, Mich.

Springlake Township—
Plerplanke, C., Bass River, Mich.
Walsma & Co., Grand Haven, Mich.

Wright Township—
Lilliebridge, Sarah, Berlin, P. O., Mich.
Schoenborn, Mrs. Mary, Conklin, P. O., Mich
Schoenborn, Conrad, Conklin, P. O., Mich.
Stephen, Joseph, Conklin, Mich.

Zeeland Township—
Fok, Albert, Zeeland, R. F. D. No. 3, Mich.
Leenhouse, Cornelius, Zeeland, R. F. D. No. 4, Mich.

Otsego County—
Dover Township—
Batchler Lumber Co., West Branch, Mich.
Sudders, G., Gaylord, Mich.

Elmer Township—
Hatch, Charley, Hallock, Mich.
Township of Elmer, Elmer, Mich.

Hayes Township—
Hayes township pits, Gaylord, Mich.

Otsego Lake Township—
Gratwick, Smith, & Fryer, (?).
Welsh, Chas., Gaylord, Mich.

Presque Isle County:
Allis Township—
Baker, Geo., Onaway, R. F. D. No. 1, Mich.
Chandler, M., Onaway, Mich.

Bearinger Township—
Eirb, J. I., Canada, N. W.
Hall, Chas., Onaway, Mich.
Doncke, E., (?).
Kidney, A. J., Ocqueoc, Mich.
McArthur, Arthur, Canada, N. W.

Bismarck Township—
Cissero, Frank, Hawks, Mich.
Elowski, Aug., Hawks, Mich.

Case Township—
Geric, Fred, Millersburg, Mich.
Whitsett, Jos., Millersburg, Mich.

Krakow Township—
Township pits, Posen, R. F. D., Mich.

North Allis Township—
Allis, North, Onaway, Mich.
Clark, J. M., Onaway, Mich.
Township pits.

Posen Township—
Garity, T., Presque Isle, Mich.
Kaborn, K., Alpena, Mich.
King, Andrew, Posen, Mich.
McPhee, M., Alpena, Mich.
Smolinski, Adam, Posen, Mich.
Sojk, Anton, Posen, Mich.
Wade, Jas., Alpena, Mich.
Zawrotny, Frank, Posen, Mich.

Pulaski Township—
Hafet, Paul, Rogers City, Mich
Liski, Joseph, Pulaski, Mich.

Rogers Township—
Larke, Augusta, Rogers, Mich.
Larke, Hoeft, & Osgood, Rogers, Mich.
Loud and Hoeft, Rogers, Mich.

Roscommon County:
Higgins Township—
Campbell Gravel Co., Roscommon, Mich.

Markey Township—
Burlson, D., Markey, Mich.
Sessband, Ralph, Markey, Mich.

Richfield Township—
St. Helen Developing Co., St. Helens, Mich.

Roscommon Township—
Michelson, Michelson, Mich.
Roscommon township pits.

Saginaw County:
Albee Township—
No sand and gravel in township.

Birch Run Township—
No sand and gravel in township.

Brady Township—
Cramer, C., Chesaning, Mich.
Koyne, E., Oakley, Mich.

Chapin Township—
Borwman, Arthur, Chapin, Mich.

Frankenmuth Township—
(?)

Jonesfield Township—
No pits in township.

Maple Grove Township—
No pits in township.

Saginaw Township—
Cresswell, Thos. B., Saginaw, Mich.
Molles, C. B., 336 Howard St., Saginaw.
Schlatterer, Christian, 327 S. Water St., Saginaw, Mich.

Thomastown Township—
Saginaw Sandstone Brick Co., Saginaw, W. S., Mich.

Zilwaukie Township—
No gravel or sand pits in township.

Saint Clair County:
Berlin Township—
Elliott, B. S., Allenton, Mich.
Eldridge, Geo. E., Allenton, Mich.
Gooch, Chas., Allenton, Mich.
Hulbert Est., Geo., Allenton, Mich.
Merritt, H. H., Allenton, Mich.

Casco Township—
Donnerback, Michael, Lenox, R. F. D., Mich.
Ruff, Michael, Lenox, R. F. D., Mich.

China Township—
Marvin, L., Marine City, Mich.
Schreinee, Martin, St. Clair, Mich.

Clyde Township—
Armitage, Sidney, Atkins, R. F. D. No. 1, Mich.
Baker, Julius, Atkins, R. F. D. No. 1, Mich.
Kinney, Chester, Atkins, R. F. D. No. 1, Mich.
Ratford, Chas., Atkins, R. F. D. No. 1, Mich.
Snyder, Wm., Atkins, R. F. D. No. 1, Mich.

Cottrellville Township—
VanComberg, Alex., Marine City, Mich.

Kimball Township—
McJennett, James, Smith Creek, Mich.
Patterson, Wm., Port Huron, R. F. D. No. 3, Mich.

Lynn Township—
Dudley, John, Brown City, Mich.

Mussey Township—
Knoll, Albert, Capac, Mich.

Port Huron Township—
Cadwell Sand & Gravel Co., Windsor, Canada.
Duluth Superior Sand & Gravel Co., Duluth, Minn.
Jaques & Sons, E. Foot First St., Duluth, Minn.
Knisley & Co., 333 River St., Port Huron, Mich.
Marine Contracting Co., 211 Quay St., Port Huron, Mich.

Riley Township—
Bearss, James, Memphis, Mich.
Chapman, James, Memphis, Mich.
Bywater, F., Memphis, Mich.
Baker, Wm., Memphis, Mich.
Pratt, Bert, Memphis, Mich.
Shafer, Chas., Memphis, Mich.
Storey, Nathan, Memphis, Mich.

Wales Township—
Armstrong, D., Emmett, Mich.
Kitchen, Serenos, Goodells, Mich.

Sanilac County:
Argyle Township—
Chase, Bud, Shabbona, Mich.
Langenberg, Geo., Argyle, Mich.

Austin Township—
Merridth, Cyrus, Tyre, Mich.
Walsh, Patrick, Tyre, Mich.

Bridgehampton Township—
Bluminfeld, E., Carsonville, Mich.
Bridgehampton township pit.
Rich, John, Deckerville, Mich.

Custer Township—
Loyd, T., McGregor, Mich.
Tallmon, H., McGregor, Mich.

Delaware Township—
Mills, Henry, Minden City, Mich.

Evergreen Township—
Parrott, Geo., Shabbona, Mich.
Travis, E. J., Shabbona, Mich.

Lamotte Township—
Lamotte township pits, Snover, R. F. D. No. 1, Mich.

Lexington Township—
Matthews, Frank, Croswell, Mich.
Munn, Mrs. D. J., Lexington, Mich.

Marvin Township—
Harris, Jas., Deckerville, R. F. D., Mich.
Boats, Fernand, Palms, R. F. D., Mich.
Furey, Andy, Palms, R. F. D., Mich.
Hunt, J. F., Palms, R. F. D., Mich.
Moore, B., Deckerville, R. F. D., Mich.
McGregor, R., Palms, R. F. D., Mich.
Mosure, Wm., Deckerville, R. F. D., Mich.
Swaffer, Chas., Deckerville, R. F. D., Mich.
Wagester, Geo., Palms, R. F. D., Mich.

Marlette Township—
Anderson, Albert, Marlette, Mich.
Buck, C. J., Marlette, Mich.
Crothers, Geo., Marlette, Mich.
Cochran, Wm., Marlette, Mich.
Dawson, Wm., Marlette, Mich.
Kerr, Wm., Marlette, Mich.
McRoy, W. W., Marlette, Mich.
Redman, Fred, Marlette, Mich.
Stephenson, Ralph, Marlette, Mich.
Sullivan, James, Marlette, Mich.

Minden Township—
Obbe, Frank, Minden City, Mich.

Moore Township—
Kennidy, Went, Argyle, Mich.
Stanton, T. J., Marlette, Mich.

Speaker Township—
Cork, William, Melvin, R. F. D. No. 1, Mich.
Gilbert, George, Melvin, R. F. D. No. 6, Mich.
Omaley, Mrs., Melvin, R. F. D. No. 1, Mich.
Reddicliffe, Wm., Melvin, R. F. D. No. 1, Mich.

Watertown Township—
Dawson & Son, Sandusky, Mich.

Schoolcraft County:
Doyle Township—
Bellenger, Joseph, Manistique, Mich.
Planute Estate, Manistique, Mich.

Germfask Township—
Cornell, W. F., Germfask, Mich.
Hargrave, W. W., Seney, Mich.

Hiawatha Township— (?)
No sand or gravel pits in this township.

Shiawassee County:
Burns Township—
Bailey, Robert, Byron, Mich.
Close, F. E., Byron, Mich.
Barnes, Millard, Byron, Mich.
Barnes, Olin, Byron, Mich.
Village of Byron, Byron, Mich.
Cosselman, John, Byron, Mich.
Graham, John, Byron, Mich.
Harrington, Jos., Byron, Mich.
Redmond, W. H., Byron, Mich.
Sheldon, P. E., Byron, Mich.
Shelp, F. B., Byron, Mich.

Fairfield Township—
Allon, F., Elsie, Mich.
Shannon, A. E., Carland, Mich.

Haselton Township—
Convy, Patric, New Lothrop, Mich.
Gillett, Wm., New Lothrop, Mich.
Leroy, Floyd, New Lothrop, Mich.

Middlebury Township—
Fulton, Mrs. D., Burton, Mich.
Simpson, Emery, Burton, Mich.

New Haven Township—
Brown, A., Corunna, Mich.
Nancampen, C., Henderson, R. F. D., Mich.

Perry Township—
Colby, Mrs. Nettie, Perry, Mich.
Drain, E. W., Morrice, Mich.
Kinney, Geo., Perry, Mich.
Green, M. H., Perry, Mich.
Millhisler, Wm., Perry, Mich.
Osborne, I. H., Perry, Mich.
Reed, Marsh, Perry, Mich.
Smith, A. D., Perry, Mich.
Thompson, Mrs. Sol, Perry, Mich.

Owosso Township—
Bock, Geo., Owosso, R. F. D., Mich.
McDonald, E. A., Owosso, R. F. D., Mich.

Rush Township—
Arthur, D., Henderson, Mich.
Huffman, George, Henderson, Mich.

Sciota Township—
Austin, C. J., Laingsburg, Mich.
Berry, W. W., Laingsburg, Mich.
Seigal, Wm., Laingsburg, Mich.
Schultz, A. A., Laingsburg, Mich.
Sherman, A. A., Laingsburg, Mich.
Stark, Joe, Laingsburg, Mich.

Vernon Township—
Gillmore, E., Vernon, Mich.
Huff, C., Durand, Mich.
Porter, G., Vernon, Mich.
Smith, J. K., Durand, Mich.

St. Joseph County:

Colon Township—
Brown, Samuel, Colon, Mich.
Greeley, Mr., Colon, Mich.
Hill, S., Colon, Mich.
Townsend, Half, Chicago, Ill.

Flowerfield Township—
Sager, Joseph, Flowerfield, Mich.
Zerby, Isaac, Marcellus, R. F. D. No. 3, Mich.

Leonidas Township—
Lawrence, Frances, Leonidas, Mich.
Miller, Fred, Leonidas, Mich.

Mendon Township—
No sand and gravel in township.

Motville Township—
Gray, Wm., Constantine, Mich.
Gang, Wm., Motville, Mich.
Morden, Mrs., Motville, Mich.
Taverner, Henry, White Pigeon, Mich.
Whitehead, T., Motville, Mich.

Park Township—
Stoffiet, Amroes, Parkville, Mich.
Veich, Emma, Three Rivers, R. F. D. No. 1, Mich.

White Pigeon Township—
Cogswell, Geo., White Pigeon, Mich.
Wade, H. H., White Pigeon, Mich.

Tuscola County:

Akron Township—
Rose, C., Akron, Mich.
Roller, Jacob, Unionville, Mich.

Columbia Township—
Bitzer, Mat, Unionville, Mich.
Colling, Dav, Unionville, Mich.
Hill, Elmer, Unionville, Mich.
Knerr, Wm., Unionville, Mich.

Dayton Township—
Haley, A., Silverwood, Mich.
Seiver, Est., Chas., Mayville, Mich.
Shay, J., Mayville, Mich.
Smith, H., Mayville, Mich.
Stahl, Jas., Mayville, Mich.

Denmark Township—
Guliver, I., Reese, R. F. D. No. 1, Mich.
King, Geo., Vassar, R. F. D. No. 1, Mich.
North, Mrs. C., Vassar, Mich.
Stott, Wm., Reese, R. F. D. No. 1, Mich.

Ellington Township—
Dorman, Ann, Caro, R. F. D. No. 8, Mich.
Lockwood, Wm., Caro, R. F. D. No. 4, Mich.

Gilford Township—
Kehn, John, Gilford, Mich.
Stewart, Alex, Gilford, Mich.

Juniata Township—
Cohnan, A., Caro, Mich.
Hess, Dr., Caro, Mich.
Hile, Tom, Caro, Mich.
Larabee, Sam, Vassar, Mich.

Kingston Township—
Brown, John, Wilmot, Mich.
Van Horn, Simon, Kingston, Mich.

Koylton Township—
Baker, Gilbert, Kingston, Mich.
Hunter, James V., Marlette, Mich.
Marion, L., Marlette, Mich.
VanHorn, A., Kingston, Mich.

Millington Township—
Donigan, Joseph, Millington, Mich.
Mohan, Amos, Millington, Mich.

Novesta Township—
Hower, Homer, Cass City, Mich.
Smith, P., Cass City, Mich.

Tuscola Township—
Consolidated Coal Co., Saginaw, Mich.
Tuscola and Frankenmuth townships, Tuscola. (?)

Wells Township—
Wells, S., Caro, Mich.
Whitkur, B., Kingston, Mich.

Watertown Township—
Bench, Geo., Mayville, R. F. D., Mich.
Brudshaw, Geo., Fostoria, R. F. D., Mich.
Fowler, Wm., Mayville, Mich.
Henderson, Mrs., Mayville, Mich.
Romp, Geo., Mayville, Mich.

Van Buren County:
Almena Township—
Brown, H. L., (?).
Thompson, G. E., (?).

Bangor Township—
Burger, F. A., Bangor, Mich.
Shine, John, Bangor, Mich.

Bloomingdale Township—
Burris, Mike, Bloomingdale, Mich.

Columbia Township—
Hoppin, A. D., Bangor, Mich.
Lyster, A. B., Breedsville, R. F. D. No. 1, Mich.

Decatur Township—
McAdan, Ed., Decatur, Mich.
McKee, Darwin, Decatur, Mich.
Mold, Daniel, Decatur, Mich.
Orr, James, Decatur, Mich.
Sherbwin, John, Decatur, Mich.

Geneva Township—
Funk, Elijah, Bangor, Mich.
Wertenberger, B., Bangor, Mich.

Lawrence Township—
Crawford, A. L., Lawrence, Mich.
Hunt, Geo., Lawrence, Mich.
Plepper, Edward, Lawrence, Mich.
Schimmel, Frank, Lawrence, Mich.

Waverly Township—
Cleveland, Harry, Gobleville, Mich.
Harvey, Hastial, Gobleville, Mich.
Brown, T., Paw Paw, Mich.

Washtenaw County:
Ann Arbor Township—
Elsifor, S. A., 117 N. 1st St., Ann Arbor, Mich.

Augusta Township—
Collin, Geo., Ypsilanti, R. F. D., Mich.
Phelps, Don D., Willis, Mich.

Freedom Township—
Burkhardt, Chas., Manchester, Mich.
Kuhl, Edwin, Chelsea, Mich.

Manchester Township—
English, A. D., Manchester, Mich.
Geskie, J., Manchester, Mich.
Hall, Homer, Manchester, Mich.
Heimendinger Bros., Manchester, Mich.
Lake Shore & Mich Southern R. R. Co., Cleveland, Ohio.
Martin, Miles, Manchester, Mich.
Mull, O., Manchester, Mich.
Parr, H., Manchester, Mich.
Paul, H. P., Manchester, Mich.
Renaux, H., Manchester, Mich.
Rheffuss, Wm., Manchester, Mich.
Schwab, John, Manchester, Mich.
Walker, Wm., Manchester, Mich.
Winster, A. J., Manchester, Mich.
Wellwood, J., Manchester, Mich.

Pittsfield Township—
Deakes, C. & O., Ypsilanti, Mich.
Pease, Wm., Saline, Mich.

Salem Township—
Boyle, Frank, Salem, Mich.
Wheeler, Calvin, Salem, Mich.

Saline Township—
Dorrel, Joseph, Tecumseh, Mich. (?)
Gorden, John, Saline, R. F. D., Mich.
Gorden, David, Saline, R. F. D., Mich.
Higgins, Will, Saline, R. F. D., Mich.
Rencler, Cris, Saline, R. F. D., Mich.
Stierle, Will, Saline, R. F. D., Mich.
Teppe, Bank, Saline, R. F. D., Mich.
Wienett, Sam, Saline, R. F. D., Mich.
Youngs, Edd., Saline, R. F. D., Mich.

Scio Township—
Frigel, Fred, Ann Arbor, R. F. D. No. 3, Mich.
Grayer, Fred, Dexter, R. F D. No. 4, Mich.

Superior Township—
Eddie, Geo., Ann Arbor, Mich.
Parker, Fred, Ypsilanti, R. F. D. No. 6, Mich.
Rooke, John, Ypsilanti, R. F. D. No. 6, Mich.
Tait, Wm., Ann Arbor, R. F. D. No. 8, Mich.

York Township—
Gilman, H. W., Milan, Mich.
Hendershot, C., Milan, Mich.
Loveland, W. J., Milan, Mich.
Laflin, L. H., York, Mich.
Lamkin, W. P., Milan, Mich.

Ypsilanti Township—
Crane, Mortimer R., 217 Michigan St., Ypsilanti, Mich.
Gotts, Wm., Ypsilanti, R. F. D. No. 4, Mich.

Wayne County:

Ecorse Township—
Little Co., The C. H., 320 Penobscot Bldg., Detroit, Mich.
McKerchey, John M., Room 2, Anchor Line Bldg., Detroit, Mich.

Canton Township—
Bird, John, Plymouth, Mich.
Wilkin, Byron, Plymouth, Mich.

Brownstown Township—
American Silica Co., Rockwood, Mich.

Hamtramck Township—
No sand and gravel in township.

Livonia Township—
Erch, Will, Plymouth, Mich.
Pankoer, Gust, Northville, Mich.

Nankin Township—
No gravel pits in township.

Northville Township—
Dekay, Elmer, Northville, Mich.
Knapp, J. O., Northville, Mich.
Tompson, Robert, Northville, Mich.
Whipple, Chas., Northville, Mich.

Redford Township—
No sand or gravel pits in township.

Sumpter Township—
Miller, H., Belleville, Mich. (Owner of sand pit.)

Van Buren Township—
Dalman, August, Belleville, R. F. D., Mich.
Miller, Jr., H. F., Belleville, R. F. D., Mich.
Raymond, John, Belleville, R. F. D., Mich.

Wexford County:

Antioch Township—
Crummer & Co., Cadillac, Mich.
Franks, John, Mesich, Mich.
Goodrich, John, Mesich, Mich.
Kinney, Frank, Mesich, Mich.

Colfax Township—
Murphy & Diggins, Cadillac, Mich.
Smith, Ed., Cadillac, Mich.

Hanover Township—
Anderson, August, (?).
Hopkins, Willet M.

Haring Township—
Haring township pits.

Henderson Township—
Cummers & Diggins, Cadillac, Mich.
Peters, R. G., Manistee, Mich.

Liberty Township—
Averill, D. B., Manton, R. F. D. No. 1, Mich.
Fewless, John, Manton, R. F. D. No. 3, Mich.
Paulson, James, Manton, R. F. D. No. 5, Mich.

Selma Township—
Bardguell, Mathew, Meanwataka, Mich.
Chaff, C. J., Cadillac City, Mich.
Hillard, George, Cadillac, R. F. D. No. 2, Mich.
Selma township pit.

PRODUCERS OF GYPSUM PRODUCTS, 1912.

Operator.	Office.	Name of plant.	Location of mine.
United States Gypsum Co.	Chicago, Ill.	Alabaster.	Alabaster.
United States Gypsum Co.	Chicago, Ill.	Midland.	Grand Rapids.
Acme Cement Plaster Co.	St. Louis, Mo.	Mill No. 5.	Beverly.
Michigan Gypsum Co., H. C. Hamilton.	Grand Rapids.		Grand Rapids.
American Cement Plaster Co.	Lawrence, Kans.	Grand Rapids.	Grand Rapids.
Grand Rapids Plaster Co.	429 Mich. Trust Bldg., Grand Rapids.	Eagle Mill.	Grand Rapids.
Grand Rapids Plaster Co.	429 Mich. Trust Bldg., Grand Rapids.	Grandville.	Grandville.
Gypsum Products Mfg. Co.	44 Powers Theater Bldg., Grand Rapids	Grand Rapids.	Grand Rapids.

PRODUCERS OF SAND-LIME BRICK, 1912.

Operators.	Office.	Works.
Genesee County:		
Flint Sandstone Brick Co., C. S. Mott, Sec.-Treas., W. E. Wood, Pres.	Box 191, Flint.	Flint.
Houghton County:		
L. S. Stone Brick Co., J. W. Wycoff, Mgr.	Calumet.	Ripley.
Lake Superior Stone Brick Co., Paul P. Roohm, Pres., J. W. Wyckoff, Mgr.	Calumet.	Ripley.
Huron County:		
Sebewaing Sandstone Brick Co., C. F. Bach, Pres., Gustav Reinhold, Supt.	Sebewaing.	Sebewaing.
Jackson County:		
Jackson Lansing Brick Co., Jno. C. Reinke, Gen. Mgr., J. L. Jackson, Pres.	Rives Junction.	Rives Junc'n.
Kalamazoo County:		
South Michigan Brick Co., Jno. C. Reinke, Gen. Mgr.	Kalamazoo.	Kalamazoo.
Kent County:		
Grande Brick Co., Wm. Joseph, Supt., H. O. Joseph, Sec'y., Jno. C. Reinke, Gen. Mgr.	Kalamazoo Ave., Grand Rapids.	Grand Rapids.
Manistee County:		
Manistee Brick Co.	Manistee	Manistee.
Menominee County:		
Menominee Brick Co., Alfred A. Henes, Sec.	Broadway & Saxton Ave., Menominee.	Menominee.
Ottawa County:		
Holland Pressed Brick Co., H. J. Yonkers, Sec. and Treas.	Holland.	Holland.
Saginaw County:		
Saginaw Brick Co., John L. Jackson, Pres., Jno. C. Reinke, Gen. Mgr.	321 N. Hamilton St., Saginaw.	Saginaw.
Wayne County:		
Michigan Pressed Brick Co., J. H. Schluchter, Mgr.	Cor. Lawton Ave., M. C. R. R., Detroit.	Detroit.
Church Brick Co.	Sibley.	Sibley.

PRODUCERS OF POTTERY, 1912.

Operators.	Office.	Works.
Ionia County:		
Ionia Pottery Co	Ionia	Ionia.
Washtenaw County:		
Markham Pottery, Harman C. & Kenneth S. Markham, Props	562 S. 7th St., Ann Arbor	Ann Arbor.
Wayne County:		
Detroit Flowerpot Co., T. S. Balsley & Son	490 Howard St., Detroit	Detroit.
Anton Hupprich	83 Otis St., Detroit	Detroit.
Jeffery-Dewitt Co	Detroit	Detroit.
Pewabic Pottery & Tile Co., Miss Mary C. Perry & H. J. Caulkins, Props	2161 Jefferson	Detroit.

PRODUCERS OF MINERAL PAINTS, 1912.

Pigment.	Operator.	Office.	Location of plant.
Met. paint	Huron Valley Consolidated Paint & Oil Co., A. J. Boatwright, Sec	24-26 S. Huron St., Ypsilanti	Belleville.
White lead, Red lead	Acme White Lead & Color Works	Detroit	Detroit.
Met. paint	Pickands, Mather & Co., (Hemlock Mine)	Cleveland, Ohio.	Iron county.

GRINDSTONE PRODUCERS, 1912.

Operators.	Office.	Quarry.
Huron County:		
Eureka Grindstone Co	Ubly	Austin.
John Holland	207 The Arcade, Cleveland, Ohio	Caseville.
Cleveland Stone Co	Cleveland, Ohio	Grindstone City.
The Wallace Co	Port Austin	Grindstone City.
Cleveland Stone Co	Cleveland, Ohio	Port Austin.

PRODUCERS OF MINERAL WATER IN 1912.

Spring.	Company.	Address.
Arctic	Arctic Spring Water Co., Cornelius	250 N. Ottawa St., Grand Rapids.
Arctic Lithia	John Sicott	Harvey.
Bromo-Hygeia Well	Bromo-Hygeia Mineral Water Co., Ltd., L. A. Wakeman	Coldwater.
Charlevoix Mineral	Charlevoix Mineral Water Co., Ed. Seaman.	Charlevoix.
Cooper Farm	Walker Gordon Farm & Laboratory Co., C. P. Price	Birmingham.
Crystal	Crystal Springs Water Fuel & Northern Ice Co., G. E. Fowle	35 No. Division St., Grand Rapids.
Eastman Springs	Eastman Springs Co., W. H. Woodruff	Benton Harbor.
Giant Mineral	Giant Mineral Water Co., Inc	Detroit.
Harrison Springs	Geo. A. Ford	360 W. Bridge St., Grand Rapids.
Lake Superior Mineral Spgs	Polaris Water Co., E. D. Cox	Marquette.
Maple Leaf Springs	Jno. H. Charbeneau	Mt. Clemens.
Medea	Mt. Clemens Bath Co	Mt. Clemens.
Midland Mineral	W. L. Stearnes, Methodist Home for the Aged	College Hill, Cincinnati.
No-Che-Mo	No-Che-Mo Mineral Spring Co., N. A. Stoddard	Reed City.
Ogemaw	Ogemaw Spring Water Co., J. W. Kinney.	Bay City.
Osseo	C. M. DeWitt	Osseo.
Pagoda	Pagoda Water Co	Mt. Clemens.
Pantland	Pantland Spring Water Co., C. McMillan	Grand Rapids.
Ponce-de-Leon	Ponce-de-Leon Co., A. W. Hine	98 S. Div. St., Grand Rapids.
Royal Oak Lithia	Royal Oak Lithia Water Co., T. O. Lumsden	Detroit (Royal Oak).
St. Louis Magnetic Min'l	Magnetic Spring Water Co., Albert W. Fausend	Saginaw, W. S.
Salutaris	Salutaris Water Co., G. H. Thompson	411 Hammond Bldg., Detroit.
Sanitas	H. H. Pike's Sons, Lute H. Pike	Topinabee.
Silver Springs	Silver Springs Water Co., Dick DeBruyn	40 W. Leonard St., Grand Rapids.
Sprudel	Sprudel Water Co., P. H. Irish	Mt. Clemens.
Sterling	Jackson Bros	Crystal Falls.
Victory	Charles Shorkey	Mt. Clemens.
White Oak	Coca-Cola Bottling Co	Battle Creek.
Ypsilanti	Ypsilanti Mineral Water & Bath Co	Ypsilanti.

TRAP ROCK PRODUCERS, 1912.

Operators.	Office.	Quarry.
Marquette County:		
Lipsett & Sinclair	Marquette	Marquette.
Marquette Stone Co	Marquette	Marquette.
Powell & Mitchell	Marquette	Marquette.

GRAPHITE PRODUCERS, 1912.

Name.	Office.	Mine.
Baraga County:		
Detroit Graphite Co., A. A. Boutell, Pres.	10-12th St., Detroit	L'Anse.
Northern Graphite Works, Edward Copps	L'Anse	L'Anse.

SANDSTONE PRODUCERS, 1912.

Operators.	Office.	Quarry.
Eaton County:		
J. W. Willis	Grand Ledge	Grand Ledge.
Houghton County:		
The Portage Entry Quarries Co.	614-206 LaSalle St., Chicago, Ill.	Jacobsville.
Portage Entry Redstone Co., Ltd	Jacobsville	Jacobsville.
Huron County:		
John Holland	207-8 The Arcade, Cleveland, Ohio	Caseville.
Cleveland Stone Co	Cleveland, Ohio	Grindstone & Port Austin.
Wallace & Sons	Port Austin	Port Austin.
Ionia County:		
David Meginnity	68 Selden Ave., Detroit	Lyons.
Marquette County:		
Furst-Neu Co	619-206 S. LaSalle St., Chicago, Ill.	Marquette.
Monroe County:		
Francis Cain	R. F. D. No. 2, Riga	Ottawa Lake.

QUARTZ PRODUCERS, 1912.

Name.	Office.	Mine.
Marquette County:		
Michigan Quartz Silica Co	Milwaukee, Wis	Ishpeming.

SCYTHESTONE PRODUCERS, 1912.

Operators.	Office.	Quarry.
Huron County:		
Cleveland Stone Co	Cleveland, Ohio	Grindstone City.
The Wallace Co	Port Austin	Grindstone City.
Cleveland Stone Co	Cleveland, Ohio	Port Austin.

CLAY MINERS, 1912.

Operators.	Office.	Mine.
Bay County:		
Valley Land Co	Bay City	Bay City.
Calhoun County:		
George D. Baltz & Co	209 S. Kendall St., Battle Creek	Battle Creek.
Ontonagon County:		
Wm. F. Emmond, Thos. Emmond Estate	Rockland	Rockland.
Jeffs Land Co., Ltd., W. B. Jeffs, Prop	Rockland	Rockland.
Robinson Clay Product Co	1010 E. Market St., Akron, Ohio	Rockland.
W. P. Vogtlin	Box 36, Rockland	Rockland.
Wexford County:		
J. Z. Stanley & Son	Harriette	Harriette.
Shiawassee County:		
New Haven Coal Mng. Co., Props. Noud Kean Coal Mng. Co., Lessees	Owosso	Six Mille Creek.

NATURAL GAS PRODUCERS, 1912.

Operator.	No. of wells.	Address.
Hillsdale County:		
C. M. DeWitt		Osseo.
Macomb County:		
August Brozwska		Warren.
John Dobberowsky		Halfway. (Grosspoint Farm.)
Frank Elwart	1	Warren, R. F. D. No. 2.
(Mrs. H.) Wm. Hanekow	1	Warren, R. F. D. No. 2.
Wm. L. Hartsig	1	Warren, R. F. D. No. 2.
Otto & Edward Jacob		Warren, R. F. D. No. 2.
August Mielke		Warren, R. F. D. No. 2.
Alfred R. Peters		Warren, R. F. D. No. 2.
Chas. Schaack		Halfway.
Louis Schemm	1	North Detroit, R. F. D. No. 1 Box 47.
Alexander Smith		Warren, R. F. D. No. 2.
Henry and John Vohs (well used by both)	1	Warren.
Max Wolgast	1	Warren, R. F. D. No. 2.
Muskegon County:		
Lawrence W. Boozer (Tenant Fred W. Reed)		Ravenna, R. F. D. No. 2.
Robert Jackson		Ravenna, R. F. D. No. 3.
Oakland County:		
Louis Granzow	1	Royal Oak, R. F. D.
Frank Grosjean	1	Southfield.
Wm. Hilzinger	2	Royal Oak.
Ed. Landan	1	Royal Oak, R. F. D.
Henry Langer	2	Royal Oak.
Ed. McHugh	1	Redford, R. F. D. 1.
Wm. J. Purdy	1	Redford, R. F. D. No. 1.
Nelson E. Springsteen		Royal Oak.
E. A. Starr		Royal Oak.
Daniel Wilkinson, Tenant, Frank Parmenter, Owner	1	Royal Oak, R. F. D.
Saginaw County:		
Saginaw Development Co		609 Barringer Bldg., Saginaw.
St. Clair County:		
Frank Dana		Algonac.
Lawrence Gillett		Port Huron, R. F. D. No. 3.
M. J., C., and L. J. Harron		Algonac.
Michigan Developing Co. (G. O. W.)	21	Port Huron.
Vancuren Brothers		Box 38, Port Huron.
Wayne County:		
Irving Becker		Redford, R. F. D. No 2.
John Degrandchamp		N. Detroit.
Unverified Names.		
St. Clair County:		
L. Gillett		Port Huron, R. F. D. No. 3., Box 38.
Henry Marks		Port Huron, R. F. D. No. 3. Box 40.
Peter Schwitzer		Port Huron, R. F. D. No. 3, Box 39.

PETROLEUM PRODUCERS, 1912.

Operators.	Address.
Saginaw County:	
Saginaw Valley Development Co	517 Bearinger Bld., Saginaw.
St. Clair County:	
Michigan Developing Co	103 Huron Ave., Port Huron.
New names—not verified.	
Dewey Hitchcock	Allegan.
Northern Oil & Gas Co	Kalamazoo.
Michigan Central Oil & Gas Co., G. W. VanCuren	Port Huron, Box 38.

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